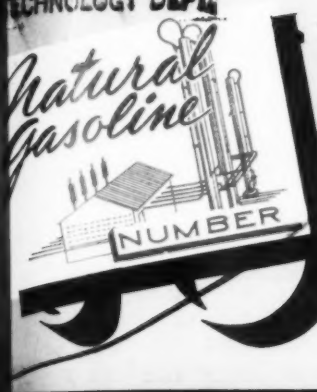
XUM

TECHNOLOGY DEPT.



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WARREN'S

STABILIZED
NATURAL GASOLINE
and STA-VOL-ENE

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QUICK STARTING • GREATER POWER • SMOOTH ACCELERATION • HIGH VOLATILITY • HIGH OCTANE • CONSTANT UNIFORMITY

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WARREN'S HOLLIDAY, TEXAS PLANT

Crude Oil, Natural Gasoline and Liquefied Petroleum Products

PRICE 50 CENTS TABLE OF CONTENTS PAGE 123 **APRIL 19, 1951**

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WHEN DRILLING TO 7,500 FEET YOU CAN DEPEND UPON THE RELIABLE

Here is a streamlined, six-speed, friction-clutch unit designed for drilling to 7,500 feet, and re-working the deepest wells. The U-15 has stood the test of time in oil fields throughout the world, and is known for efficient, reliable, and economical operation.

O[illegible] all six [illegible] table. [illegible] controls all [illegible]

[illegible]terchangeable sprocket [illegible]otary table widens "6 [illegible]peed" range.

[illegible]e rotary clutch pedal [illegible]r engagement and dis-[illegible]engagement, with auto-[illegible]matic lock.

[illegible]eavy guards [illegible]rotary table d[illegible] sprocket [illegible]nd the rat-[illegible] digger. Choice of s[illegible] cat-head or Uni[illegible] ard cathead.

W[illegible] line hitch on both [illegible] of skid — popular [illegible] truck drivers.

[illegible]sk your supply store, or write for complete in-formation on the U-15.

UNIT RIG & EQUIPMENT CO.
TULSA, OKLAHOMA U.S.A.

DESIGNED FOR THE JOB....

Exclusive Export Representative
MID-CONTINENT SUPPLY CO.
42 Broadway, New York City
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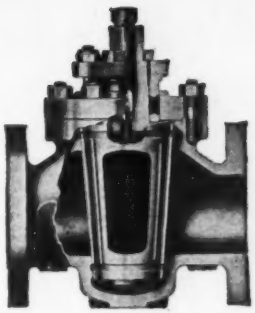
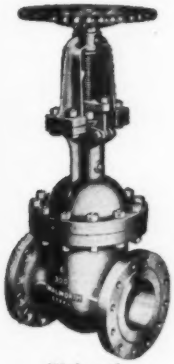
● VALVES

● PIPE FITTINGS



Walworth
Lubricated Plug Valve



Walworth
Steel Gate Valve

Walworth
Iron Body Gate Valve

Walworth
"500 Brinell" Bronze Globe Valve

Walworth
Iron Body Saddle Gate Valve

Walworth
Cast Steel Flanged Fittings

Walworth manufactures a *complete line* of valves and pipe fittings: all made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties. In design, construction, and performance, Walworth products reflect more than a century of experience in the manufacture of quality valves and fittings.

Your Walworth distributor will give you full information on the *complete line* of Walworth steel, iron, and bronze, and special alloy valves and pipe fittings; also Walworth Lubricated Plug Valves, and Walseal* valves, fittings and flanges. Ask for this information today.

*Patented—Reg. U. S. Pat. Off.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

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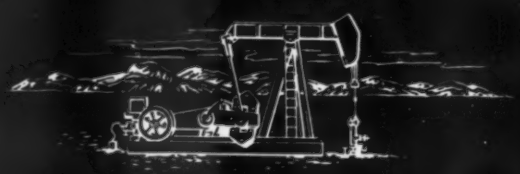
Good Start...



for Better Pumping!

This easy-starting Fairbanks-Morse "ZC" Engine gets your pumping rig off to a good start . . . *even on the coldest mornings.* Fairbanks-Morse High Tension Magneto supplies a "hot" spark that eliminates costly starting delays. There are no complicated parts in a "ZC" . . . no delicate adjustments to cause trouble. Maintenance is simplified, and costs are exceptionally low. Stop in at your supply store and see the Fairbanks-Morse "ZC" . . . the economical answer to any pumping problem. Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE,

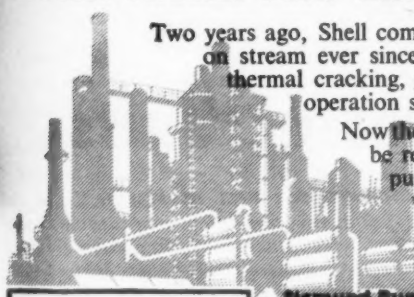
a name worth remembering

"ZC" ENGINES • PUMPS • ELECTRIC MOTORS • LIGHT PLANTS GENERATORS • DIESEL AND DUAL FUEL ENGINES • SCALES

Shell Repeat Order for Sigmund Pumps!

Process Pump Output -over 20,000 H.P.

BIGGEST PROCESS PUMP INSTALLATION EVER DESIGNED AND MADE IN BRITAIN



Two years ago, Shell commissioned the first distillation unit at Cardon, Venezuela and it has been on stream ever since. The process pumps operating in this distiller — along with units for thermal cracking, gas tail, high vacuum and other sections of the refinery, which went into operation shortly afterwards, were supplied by Sigmunds.

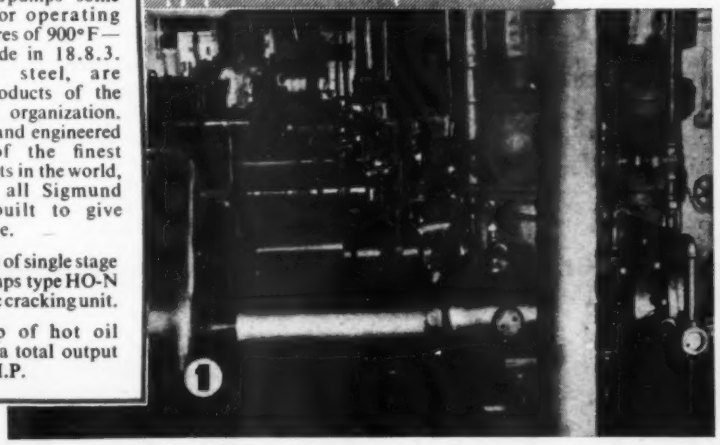
Now the second distillation unit has been put in hand, and once more Sigmund are to be responsible for the pumps. This new contract raises the total of Sigmund pumping equipment at the Cardon refinery to over 20,000 h.p., in a plant which will have an intake of crude oil in the region of 140,000 barrels a day when the additional distillation unit is completed — sufficient to provide over a third of Britain's requirements of petroleum products.

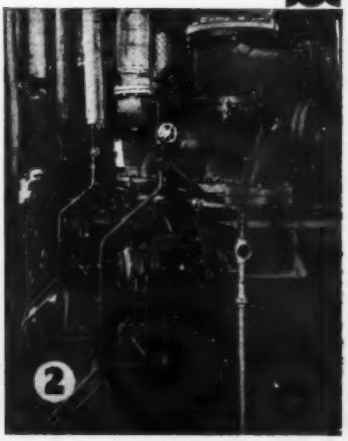
Sigmund Pumps Ltd., Terminal House, 52, Grosvenor Gardens, London, S.W.1.

The process pumps – some of them for operating temperatures of 900° F — others made in 18.8.3. stainless steel, are typical products of the Sigmund organization. Designed and engineered in one of the finest pump plants in the world, and, like all Sigmund pumps, built to give real service.

1. Group of single stage slurry pumps type HO-N in catalytic cracking unit.

2. Group of hot oil pumps of a total output of 3,000 H.P.

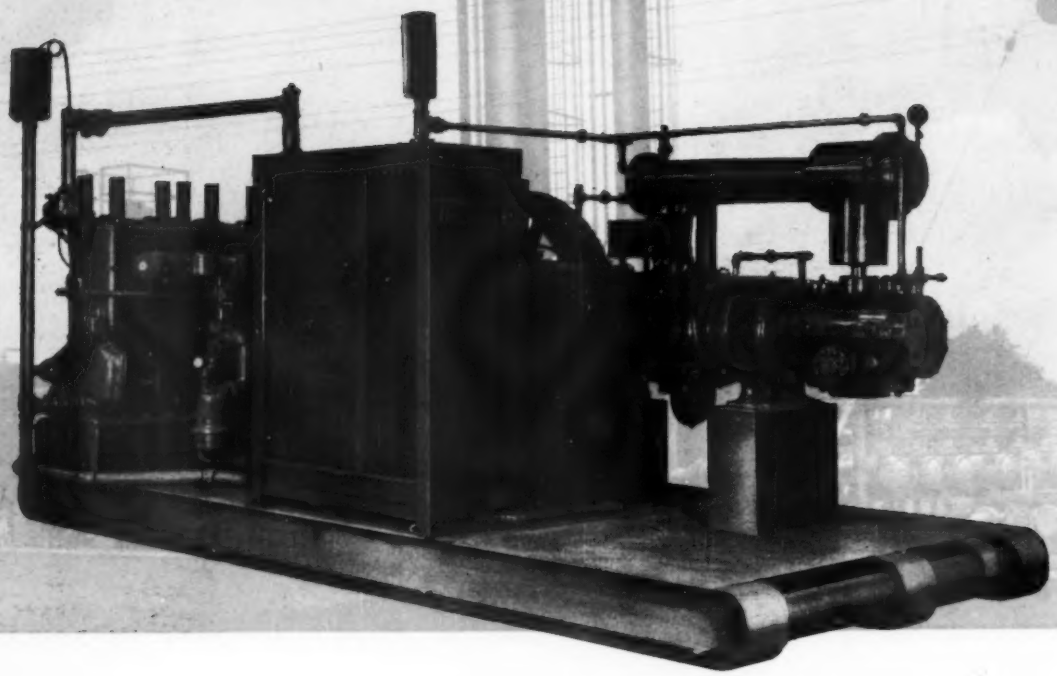




S.P.4

New York address: 30 Church Street, 7, N. Y. Tel.: Worth 4-3396

Strip your gas of GASOLINE



—with "Oilwell" Compressor Units

THESE Compressor Units are custom-made to meet your specific application requirements. Their heavy-duty construction, completeness-of-assemblies and conservative ratings result from "Oilwell's" many years' experience in engineering equipment of this type.

Single or multi-stage compressors are mounted on sturdy skid bases—suitable for inexpensive installations, with or without housing. Prime mover, together with adequate cooling systems, operating gauges, controls, etc. are all built-in and represent "balanced" components that will give dependable service with minimum maintenance.

Available in
25, 50, 75, 100, 125 and 150-HP Sizes

THE "OILWELL" COMPRESSOR UNIT ILLUSTRATED is in the 150-HP range . . . with two-stage compressor capable of taking gas at 25 psi and compressing it to 650 psi at the rate of approximately 731,000 cubic-feet-per-24-hours. It has a split-type cooler with separate, closed cooling system for the compressor, independent of the one for the engine. This unit is powered by a model NKU Waukesha Engine.

Let your "Oilwell" representative . . .
. . . help analyze the factors involved in your gasoline-plant application and specify the "Oilwell" Compressor Unit best suited for your job . . . or write for Booklet No. 17-51.

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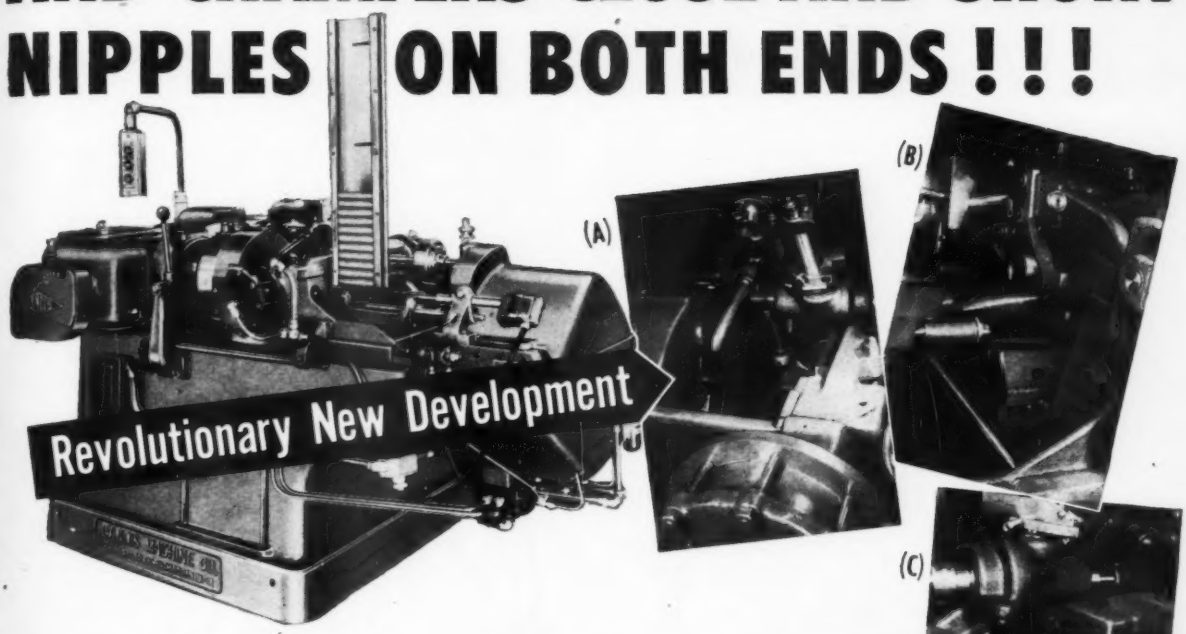
USS TRADE MARK

"OILWELL"
TRADE MARK

UNITED STATES STEEL

AUTOMATICALLY THREADS, REAMS AND CHAMFERS CLOSE AND SHORT NIPPLES ON BOTH ENDS ! ! !



The new LANDIS Automatic Close Nipple Machine allows mass production of commercial standard close, short, and special short nipples without manual handling during the production cycle. A single operator can supervise two or three machines, depending on the nipple length, for he must only fill the magazines with blanks and remove the finished nipples when ejected.

The production cycle begins when the blanks are released automatically from the magazine on the left-hand carriage, and gripped automatically by the air-operated vise. The left-hand carriage then advances to the thread-starting position and assumes a feed rate of travel equal to the lead of the thread being cut.

At the completion of the threading, and simultaneous reaming and chamfering operations on one end of the blank, the die head and vise open and the carriage returns to loading position, leaving the semi-finished nipple in position for transfer to the right-hand carriage. Mechanical fingers remove the semi-finished nipple, turn it end-for-end (**A**), and place it in position on the work-rest bar of the right-hand carriage (**B**).

The semi-finished nipple is then gripped automatically, the operations performed on the unfinished end (**C**), and ejected when finished (**D** & **E**). Simultaneously another blank has begun the cycle on the left-hand carriage.

Write for additional information on this new development in nipple production.

LANDIS *Machine* CO.

WAYNESBORO
PENNSYLVANIA

Represented in the Domestic Oil Fields by: Colcord-Wright Machinery & Supply Co., St. Louis, Mo.; C. J. Harter Machinery, Houston, Texas; Frederic-Baker Co., New Orleans, La.; Moore Machinery Co., Los Angeles and San Francisco, Calif.; Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.

For heavy duty service rely on LORAIN ENGINES!

Built with an extra margin of stamina, Lorain Engines are ideal for hard, continuous service under rugged oilfield conditions.

Thermo-syphon cooling system eliminates water pump yet maintains efficient engine temperature *under all loads regardless of climatic conditions.*

Simple two-cycle, single-cylinder design reduces moving parts to a minimum. Large capacity oil reservoir with combination forced-feed and splash lubrication assures trouble-free operation. Costly downtime for reboring is banished because wet-sleeve, cast-iron cylinder liner can be quickly, easily replaced in the field.

For dependable low-cost power rely on Lorain Engines. Ask your Oilwell Supply Company representative for full details, or write for literature.

A-3947

CONDENSED SPECIFICATIONS

	Type L	Type O	Type R	Type A
Bore	7½"	9½"	12"	13"
Stroke	8"	10"	13"	13"
Speed Range RPM	300-600	240-450	185-300	185-300
Rated Horsepower	10.7-21.4	17.2-32	27-40	32-50
Overall Height	53"	59"	68"	68"
Overall Length	72"	88"	110"	110"
Overall Width	48"	58"	72"	74"
Approx. Ship. Wt.	2600 lbs.	3800 lbs.	8000 lbs.	8200 lbs.

WHITE-ROTH
Machine Corp.
LORAIN, OHIO

AL

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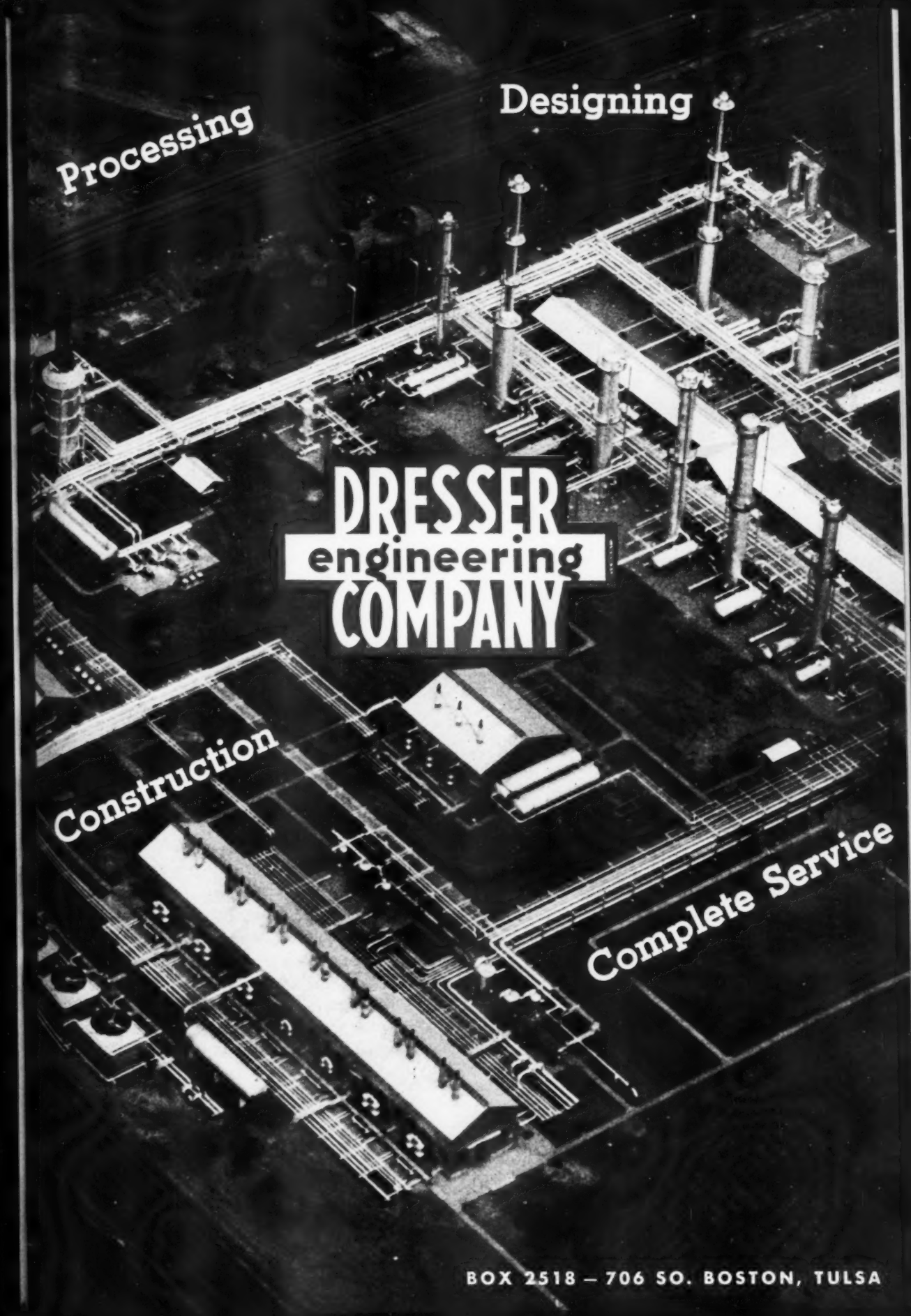
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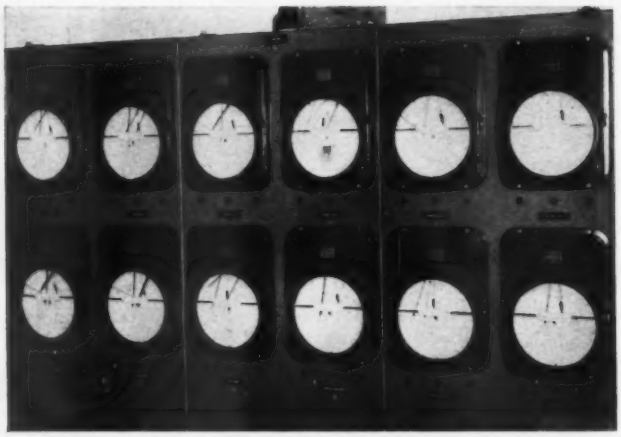
GAS DISPATCHING MADE EASIER

by Bristol Metameter* telemeters and remote control



THESE BRISTOL METAMETER RECEIVERS are in the dispatcher's office of Colorado Interstate Gas Company.

AREA COVERED BY BRISTOL METAMETER TELEMETERS. This installation has been in operation for four years.

No matter how far-flung and complex a pipe line system may be, critical pressures and flows all along the line can be observed and controlled from a central point by Bristol Metameters.

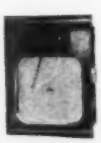
The use of Metameters by the Colorado Interstate Gas Company is typical. Bristol Metameter receivers in its Colorado Springs dispatching office record suction and discharge pressures at nine of the compressor stations along its 555 mile gas pipe line and the flow and static pressure at five of its metering stations.

These Metameter telemeters give the dispatcher a clear picture of pressure and flow conditions along the entire pipe line.

Many other pipe line and gas companies from coast to coast use Bristol Metameter to obtain up-to-the-minute knowledge of what is going on throughout their systems and maintain finger-tip control over any combination of conditions that may arise. Several installations have been in operation over 15 years.

Use by pipe line companies includes (in addition to those mentioned above) remote setting of regulators and flow controllers; remote readings of pressure at transfer point and flow of gas into distribution system; sounding alarms when low and high limits of pressure and flow are exceeded; totalizing flow through several lines. Readings are transmitted over any two-wire circuit or its equivalent (private wires, telephone circuits, carrier channels and radio, including microwave). Receivers may be recording (narrow or wide strip or round chart) or indicating.

For further information on the use of Metameters by pipe line and gas companies, from coast to coast, request Bulletin M1700, THE BRISTOL COMPANY, 120 Bristol Road, Waterbury 20, Conn. *Reg. U. S. Pat. Off.



THE DEPENDABLE GUIDEPOST OF INDUSTRY

BRISTOL

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

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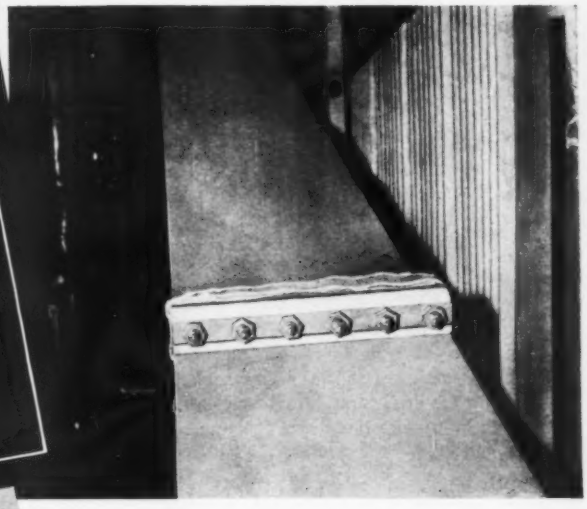
BUY IT ENDLESS—SPLICE IT—CLAMP IT

You can't beat Compass for Belt Service

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified COMPASS CORD BELTS for
HEAVY-DUTY OIL FIELD OPERATIONS
COMPASS BELTS are bodied with multi-strand cords, laid in a single plane to carry the load. Cords on opposite sides of belt axis are twisted in opposite directions to insure true running.

Whether your COMPASS CORD belt is made endless at the factory or spliced in the field with Goodyear's patented vulcanizer-splicer, it's "tops" for service. Belt shown served 13 years so far, pumping 1,000 barrels of oil a day in spite of dust, grease and heavy overload. Ask the G.T.M.—Goodyear Technical Man—for advice on your tough drives.



Clamped, using standard compression clamps, this COMPASS CORD belt *ran for 18 years without even one take-up* driving a band-wheel pumping unit in the Southwest. No stretch, no take-up—nothing but service! The G.T.M. can help you, too, on band-wheel installations.

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

GOODYEAR

THE GREATEST NAME IN RUBBER

Compass—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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a Sweet Performing Valve

PROCESSING TANKS FOR CHERRIES AND SYRUP AT DAGGETT CHOCOLATE COMPANY, CAMBRIDGE, MASS.

These tanks at the Daggett Chocolate Company process thousands of gallons of syrup and cherries. The syrup and cherries are used to make Daggett candies and are also supplied to ice cream manufacturers and bakeries. Rockwood Ball Valves help keep these tanks in operation by giving longer and better trouble-free service. These Valves are constantly in use and have been on the lines for over 2 years — and during that time required *no maintenance*.

Floors are kept clean because when Rockwood Ball Valves are closed, they close tight and prevent syrup from dripping. Other makes of valves leaked as sugar would get into the valve slot and prevent a tight seal.

Rockwood Ball Valves are also used to draw-off corn syrup and on draw-off lines on cooking kettles.

Remember — every Rockwood Valve is designed and built to outlast any other valve on the market. See your distributor — see for yourself that Rockwood Ball Valves have the best engineering features your money can buy. Look for these outstanding features when you buy your valves — leak proof service, full *round* flow, easy operation, no maintenance.

Rockwood Ball Valves are recommended for 300 p.s.i. working pressure. Thousands of Rockwood Ball Valves are in service in oil refineries, food, paper, textile, chemical and rubber plants, etc. Write today for prices and sizes.

Distributors in all principal cities.

ROCKWOOD

2" Rockwood Ball Valve on corn syrup draw-off line. Tight seal of floating ball against synthetic seat prevents syrup from dripping on floor.

ROCKWOOD
SPRINKLER COMPANY
104 HARLOW STREET
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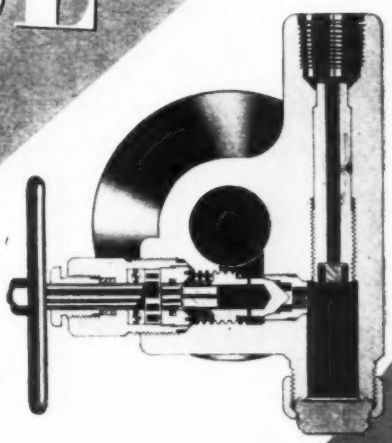
FROM THE MASTER VALVE UP . . .

TOP YOUR TREES WITH O-C-T JE FLOW CONTROLS



There is good reason why O-C-T "JE" Flow Controls are now on nearly 4000 trees: in a single compact unit, the O-C-T "JE" Flow Control replaces a tee or cross, wing valve, choke and bottom hole test adapter. Besides, it eliminates three flange connections and effects cost and weight savings as high as 90%. It operates free and easy at high pressures . . . provides quick, easy field maintenance . . . is adaptable to either positive or adjustable chokes. So don't be handicapped by habit. Before you top your next tree, investigate all the advantages and tremendous savings this remarkable O-C-T "JE" Flow Control Unit offers you. Write today or ask your O-C-T representative for details. All O-C-T equipment is available through recognized supply stores.

Here are actual prices!

2", 2½" and 3"
Series 600, 900 and 1500
"JE-1" $198.00
(complete with cap assembly)

2", 2½" and 3"
Series 600, 900 and 1500
"JE-2" $176.00
(less cap assembly)

Oil Center Tool Co.

P. O. Box 3091, Houston, Texas

Canada — Canadian-Vickers, Montreal, Canada

Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Southall, Middlesex, England. Address Export Inquiries for All Other Countries to P. O. Box 3091 Houston 1, Texas.

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FOR PROTECTING YOUR PIPELINES WITH BARRETT* COAL-TAR COATINGS

1. **BARRETT coal-tar enamels** and application procedures are available for every pipe-coating use in the oil and gas field, and for use under all types of climatic conditions and topography.
2. **Barrett makes coal-tar enamels** in grades that will not crack at —20°F., nor flow at 160°F.
3. **BARRETT coal-tar enamels** possess high ductility and flexibility in all grades, and show high resistance to soil stresses.
4. **BARRETT coal-tar coatings** adhere closely to the pipe, and are not damaged by "breathing," nor by deflectional stresses caused by loading of the back-fill.
5. **BARRETT coal-tar enamels** have high dielectric properties—require less "outside" current to make cathodic protection effective.
6. **BARRETT coal-tar enamels** are impermeable to moisture.
7. **BARRETT coal-tar enamels** are resistant to attack by gas and petroleum products.
8. **Another advantage** of BARRETT coal-tar coatings is the widespread experience of the engineers and contractors who have worked with them.
9. **Also, their universal availability** and ease of application, through applicators all over the country.
10. **And last, but not least,** the Barrett organization is always at your disposal to advise on materials and on application procedure, and to consult with you on any pipe-coating problem.

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

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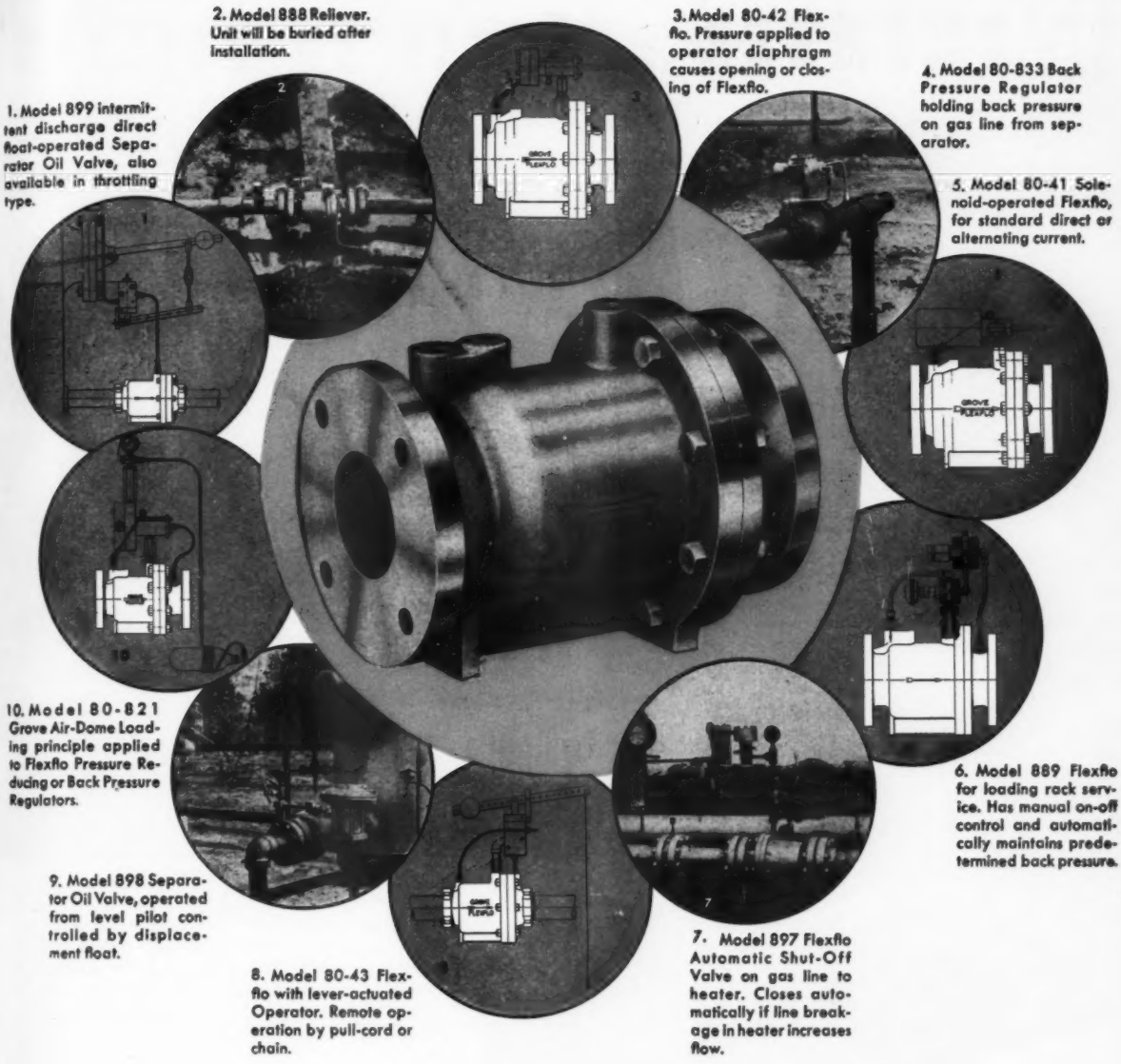

1. Model 899 intermittent discharge direct float-operated Separator Oil Valve, also available in throttling type.

2. Model 888 Reliever. Unit will be buried after installation.

3. Model 80-42 Flexflo. Pressure applied to operator diaphragm causes opening or closing of Flexflo.

4. Model 80-833 Back Pressure Regulator holding back pressure on gas line from separator.

5. Model 80-41 Solenoid-operated Flexflo, for standard direct or alternating current.

6. Model 889 Flexflo for loading rack service. Has manual on-off control and automatically maintains predetermined back pressure.

7. Model 897 Flexflo Automatic Shut-Off Valve on gas line to heater. Closes automatically if line breakage in heater increases flow.

8. Model 80-43 Flexflo with lever-actuated Operator. Remote operation by pull-cord or chain.

9. Model 898 Separator Oil Valve, operated from level pilot controlled by displacement float.

10. Model 80-821 Grove Air-Dome Loading principle applied to Flexflo Pressure Reducing or Back Pressure Regulators.

The Versatile GROVE Flexflo

The heart of each unit shown here is the never-failing Flexflo Valve. Whether your control problem is simple on-off; pressure reduction or relief; holding back-pressure; automatic shut-off; continuous or intermittent separator discharge, or any of a score of other services, the Flexflo is the valve for the job.

This flexibility is achieved through Grove's broad range of Operators. These Operators match and complement the Flexflo's ability to close bubble-tight, to resist corrosion and erosion, and to give the maximum of maintenance-free performance. Contact the nearest Grove office today for full details.

GROVE REGULATOR COMPANY
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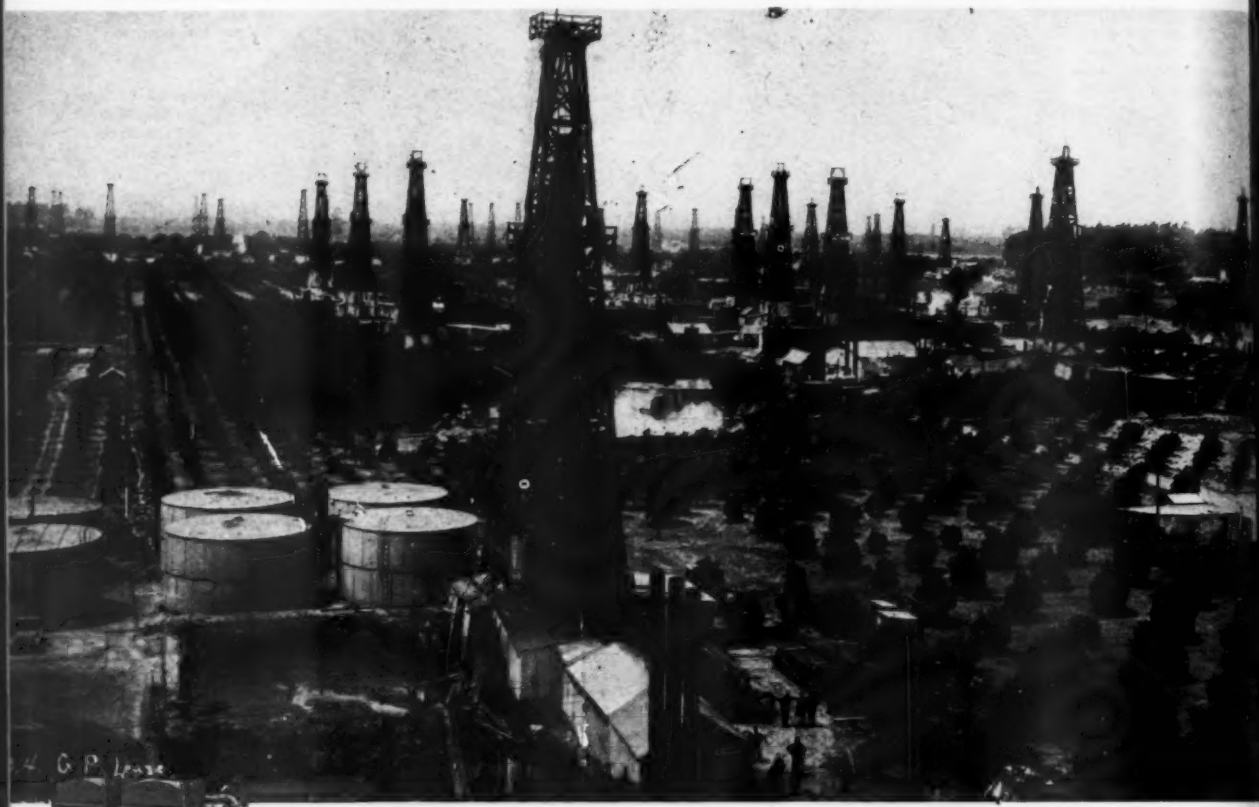
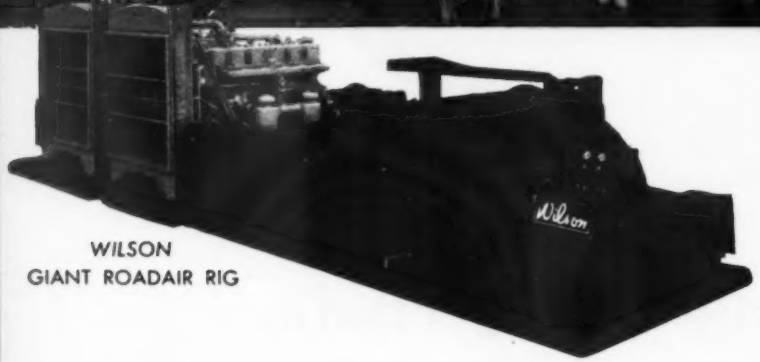
1901 Calumet, Houston, Texas

1930 W. Olympic Blvd., Los Angeles 6, California

GROVE FLEXFLO REMOTE CONTROL VALVE

REMEMBER..."Santa Fe Springs"





WILSON
GIANT ROADAIR RIG

SANTA FE SPRINGS... where Oranges were dipped in crude oil, and flavored with "Mail Pouch." Wooden derricks, steam engines and the California climate moved with the tide of empire, toward a great population shift.

**WILSON WAS THERE,
WILSON WAS FIRST!**

The first power rig in California was a WILSON!

5 STAR FEATURES—Exclusive to Wilson Rigs!

1. Designed to operate either with or without torque converters.
2. With four Friction Clutch Speeds to the Drum.
3. Equipped with Air-Tube Disc Clutches, on all drives. The World's Best Clutch!
4. With Box Type Compound that is split into sections, one for each engine.
5. That has no Flexible Coupling between engine and compound and needs none.

YOU CAN DEPEND ON A Wilson RIG!

Compare Prices Before You Buy!

Wilson MANUFACTURING CO., Inc.
WICHITA FALLS, TEXAS

XUM

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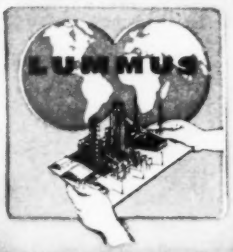
Think of this sign first . . . . . .

for Ethylene

Manufacturing Facilities



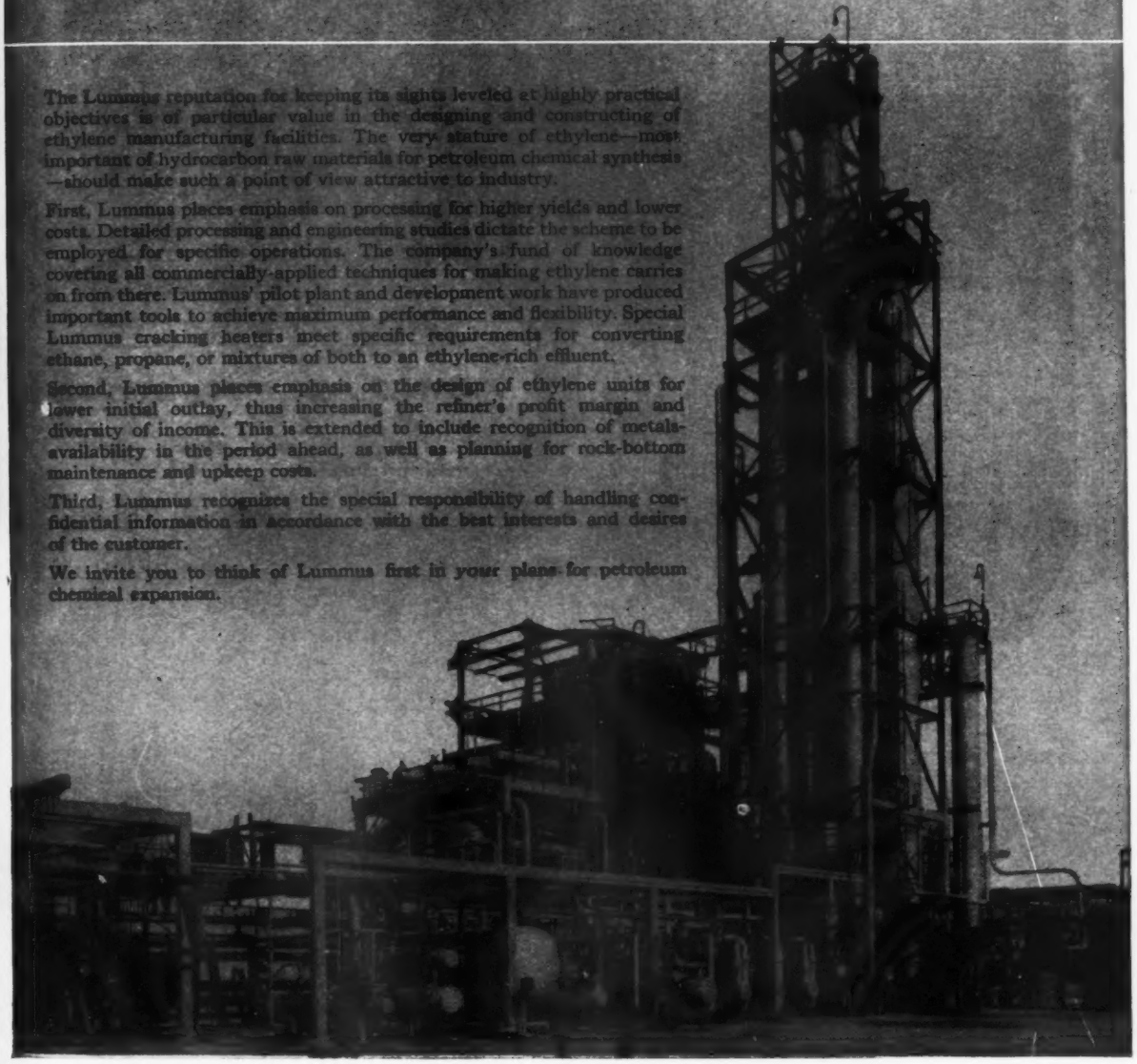
The Lummus reputation for keeping its sights leveled at highly practical objectives is of particular value in the designing and constructing of ethylene manufacturing facilities. The very stature of ethylene—most important of hydrocarbon raw materials for petroleum chemical synthesis—should make such a point of view attractive to industry.

First, Lummus places emphasis on processing for higher yields and lower costs. Detailed processing and engineering studies dictate the scheme to be employed for specific operations. The company's fund of knowledge covering all commercially-applied techniques for making ethylene carries on from there. Lummus' pilot plant and development work have produced important tools to achieve maximum performance and flexibility. Special Lummus cracking heaters meet specific requirements for converting ethane, propane, or mixtures of both to an ethylene-rich effluent.

Second, Lummus places emphasis on the design of ethylene units for lower initial outlay, thus increasing the refiner's profit margin and diversity of income. This is extended to include recognition of metals-availability in the period ahead, as well as planning for rock-bottom maintenance and upkeep costs.

Third, Lummus recognizes the special responsibility of handling confidential information in accordance with the best interests and desires of the customer.

We invite you to think of Lummus first in *your* plans for petroleum chemical expansion.



THE LUMMUS COMPANY

385 MADISON AVENUE, NEW YORK 17, N. Y.

CHICAGO • HOUSTON • LONDON • CARACAS • PARIS

DESIGNING ENGINEERS AND CONSTRUCTORS FOR THE PETROLEUM AND CHEMICAL INDUSTRIES

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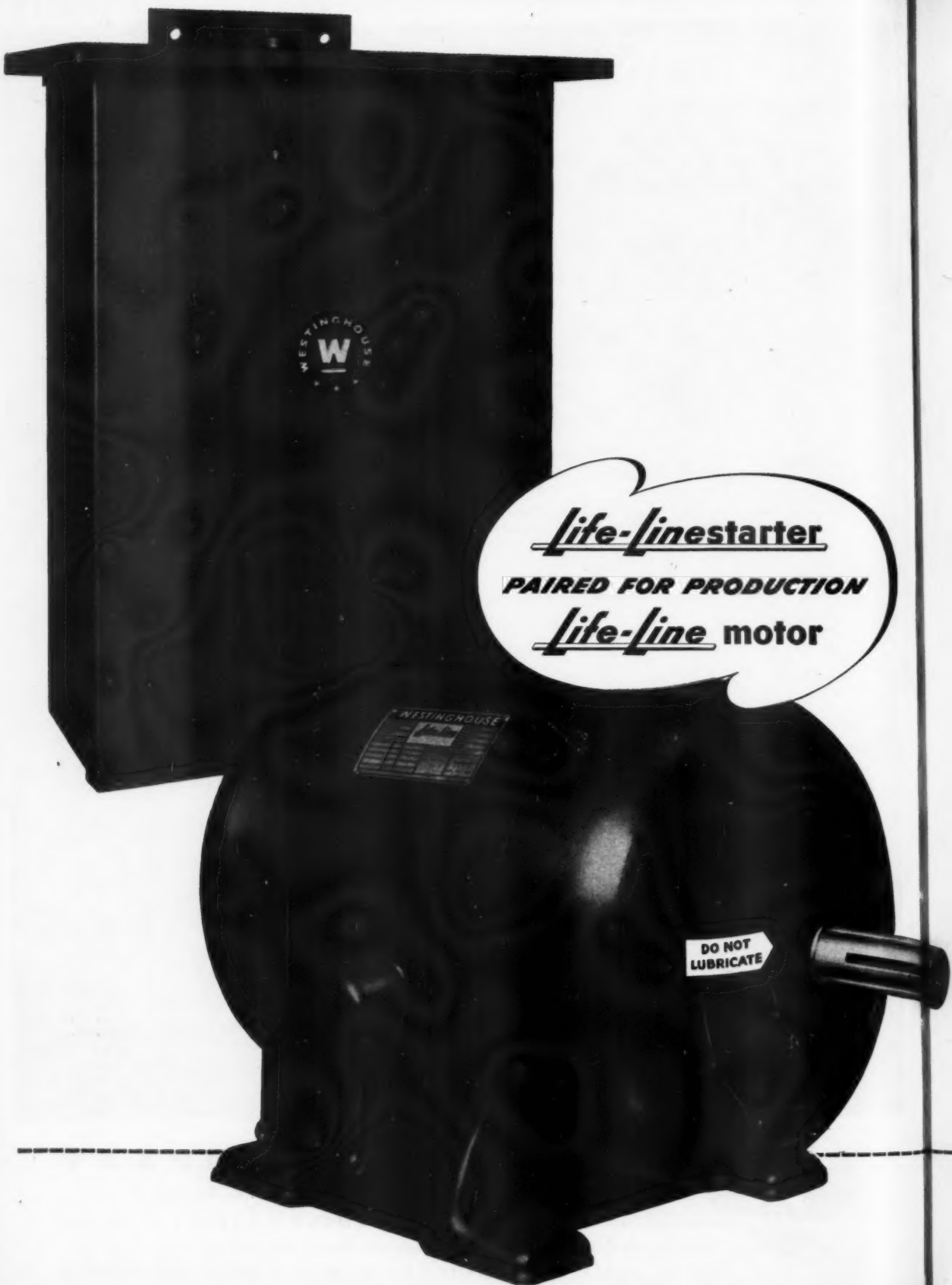

WESTINGHOUSE
W
Life-Linestarter
PAIRED FOR PRODUCTION
Life-Line motor
WESTINGHOUSE
DO NOT
LUBRICATE

Stay On-Stream longer with this protected pair

Here is a motor and control team especially built for outdoor oil well pumping service. Notice how each is extra protected to guard against rain, snow, sleet.

Look at the outer hood of the motor that gives extra protection against weather. And the controls—AB Circuit Breaker and Life-Linestarter®—are combined in one weatherproof enclosure suitable for pole mounting.

Protection against weather is part of the story. What's more, these two have the stamina to stand up to continuous pumping duty with a minimum of attention.

The Life-Linestarter is years ahead in principle of operation. Only one moving element. Nothing to stick or jam. Vibration, jars or accidental blows cannot cause false operation. Where cycle pumping is required, the built-in time switch handles the "ON" and "OFF" operations automatically. Releases pumper from making periodic trips to the well for manual switching.

You can't get a more rugged motor than the Life-Line. Its steel frame, brackets and feet can take severe shock duty imposed by pumping service. Pre-lubricated bearings need no lubrication . . . eliminate outages due to faulty lubrication.

If it's dependability you want, check these two. They're paired for performance. Ask your Westinghouse representative for copies of "Life-Line Motor Book", B-3842 and "Tomorrow's Starter Today", B-4677, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21641

YOU CAN BE SURE... IF IT'S Westinghouse

Life-Line MOTORS and CONTROLS

An Important Message for Every Oil Producer

How to Keep Flooding Water From Plugging Your Input Formation!

☆

Install INFILCO *Water Conditioning Equipment*

Water forced through the fine pores of oil sand *must be* properly *conditioned* or plugging is sure to result. As a producer you can't take chances. Other producers have eliminated this problem by the installation of Infilco water conditioning plants. These efficient plants remove suspended solids, and prevent the formation of chemical reaction products and organic growths on the face of the formation. Some producers use water from lime formations, some from nearby lakes, some from streams, but, in every case *exclusive* and *time-tested* Infilco methods and equipment assure them a crystal clear, chemically stable water that is ideally suited for flooding purposes.

You can expect the same performance from Infilco water conditioning equipment on your producing site. The reason? Infilco's free laboratory service determines the exact characteristics of your water supply. Then, by combining over 55 years of water conditioning research and experience with the freedom of being able to select from a *complete range* of Infilco designed and manufactured equipment, a plant is recommended which exactly fits *your* needs.

Make sure the water you put in your wells produces results—not failures. Call in the nearest Infilco Field Engineer. Or write our executive offices in Tucson for free laboratory and water analysis service. There's no obligation, of course—only the obligation to yourself to investigate the offerings of the leader—*Infilco!*

SERVING THE OIL INDUSTRY WITH
WATER CONDITIONING EQUIPMENT THAT'S

Quality Engineered for Quality Performance

INFILCO
• BETTER WATER CONDITIONING AND WASTE TREATMENT SINCE 1894

INFILCO INC.

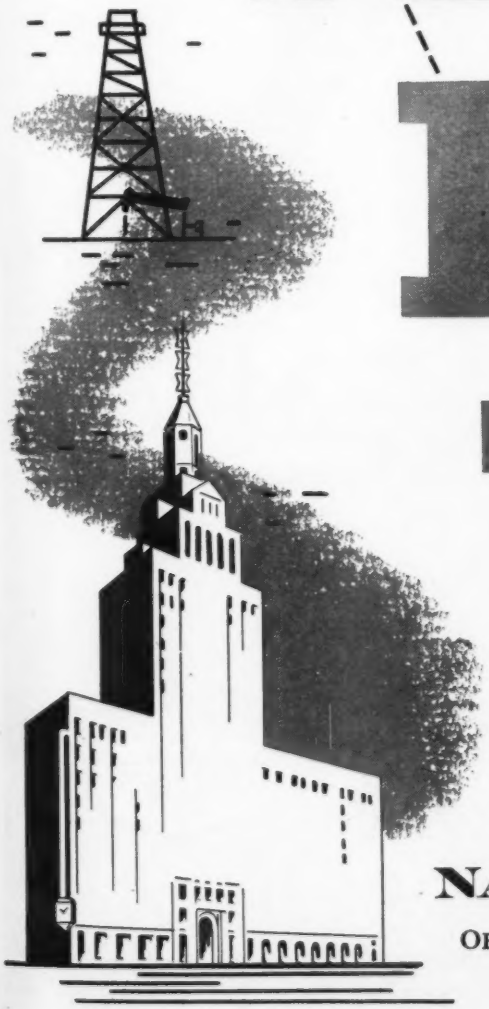
NEW YORK 17 • **TUCSON** • CHICAGO 16

SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT

XUM

OIL... and NBT



NBT officers know enough about oil industry operations and financing to insure intelligent decisions and quick action.

Bank funds are available to finance their operations. Loans are available in liberal amounts to finance a complete and well planned program.

Time is allowed to accomplish your purpose and complete your program. See a friendly officer at NBT for your next oil loan.

The Oil Bank of America

NATIONAL BANK OF TULSA

OFFERING COMPLETE BANKING AND TRUST SERVICES

Member Federal Deposit Insurance Corporation

XUM

In Republic Electric Weld Line Pipe, *uniformly round ends* match perfectly.

Uniform diameter speeds joint welding.

Uniform wall thickness means dependability in every inch.

Uniform high yield strength permits building of higher pressure lines.

Uniformly straight lengths line up evenly.

High ductility steel simplifies *field bending.*

Low carbon steel *welds readily.*

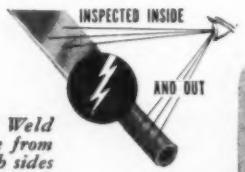
Freedom from scale protects against clogged valves.

Long lengths reduce number of joints.

Inside and out inspection guards against hidden defects.

Over 59,000 miles of Republic Electric Weld Line Pipe placed in service during the past 22 years—in transmission, distribution, collecting and product lines—prove its dependability. Write for literature.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.



Republic Electric Weld Line Pipe is made from flat-rolled steel, both sides of which are inspected. Thus, the surface which becomes the inside wall is free from hidden defects.

REPUBLIC STEEL

Republic
ELECTRIC WELD LINE PIPE

Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

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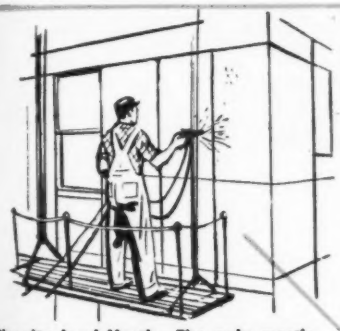
WE LIVE—

WE BREATHE—

WE THINK—

Coatings



Gilsonite Insul-Mastic—The only mastic coating ever approved under original U. S. specifications for the preservation of bombers and war materiel. Moisture vapor transmission rate of only .01 grams per 24 hours per 100 square inches per ⅛" thickness by actual government test.

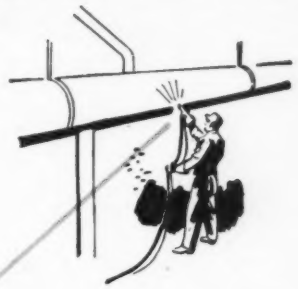
Insul-Mastic Type "D"—Sprayed insulation. Adheres at any angle. Stops 65% of heat loss. Water repellent.

The only business of the Insul-Mastic Corporation of America is the manufacturing of the best coatings possible to formulate. Our entire research and development is concentrated solely upon the production of better coatings. We have no other lines to divert us from this one aim—which is one of the many reasons why we excel in:

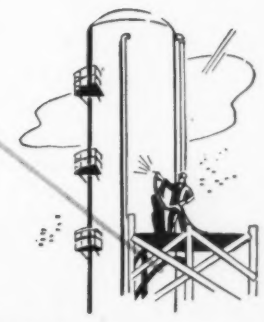
- **CORROSION PREVENTION**
- **MOISTURE SEALING**
- **VAPOR SEALING**
- **INSULATION**

Insul-Mastic coatings are homogenized. The solvents do not separate. The smooth homogenized texture throughout assures you of easy pumping and definitely helps sprayman to avoid blobs and pinholes.

Think first of the coatings that last!

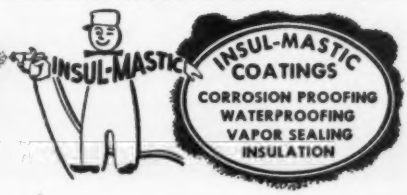


Insul-Mastic Vinyl System—Flexible for use over rigid and semi-rigid insulation. Provides a tough resilient moisture barrier to protect thermal insulation. Eliminates use of chicken wire and asbestos cement.



Gilsonite Insul-Mastic—Highly resistant to acids, alkalis, moisture and wear. Exceptionally long life.

Insul-Mastic Corporation
OF AMERICA
1158 OLIVER BUILDING · PITTSBURGH 22, PA.
Representatives in Principal Cities



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R&S design and precision manufacture meets and exceeds Underwriters' Laboratories and NEMA requirements.

THE MOST COMPLETE LINE OF RECEPTACLES AND PLUGS

R & S manufactures the *most complete* line of quality plugs, receptacles and connectors ever made available to industry! Types, sizes and assembly combinations for waterproof, weathertight and explosion-proof applications are made in almost endless variety, for standard or reverse service. Capacities range widely from 10 to 400 amperes. Polarized plugs cannot be inserted incorrectly. Sealed cable grip excludes all dust and moisture. Ample wiring space facilitates servicing and inspection.

WRITE FOR CATALOG NO. 9048-13.

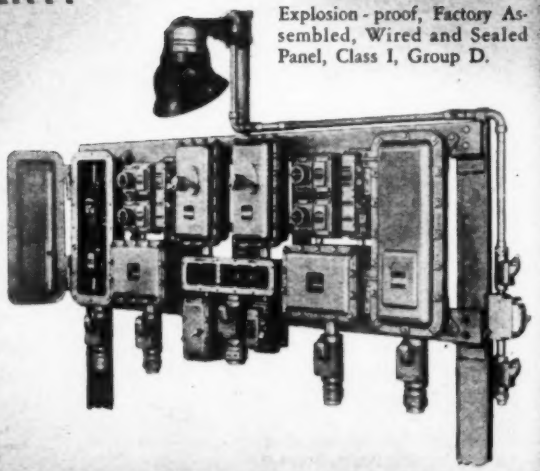
2 OUTSTANDING R&S PRODUCT LINES

R & S IS "HEADQUARTERS" FOR EXPLOSION-PROOF EQUIPMENT!

The wide variety of R&S explosion-proof equipment includes many standard enclosures—compact units possessing a high degree of flexibility and "packaged" safety. Circuit Breakers, EFS Switches, Push Buttons, Pilot Lights, Motor Starters, Combinations and individual Panels up to 32 circuits . . . all have slide operating mechanisms, removable front covers, abundant wiring space and conduit outlets . . . along with individual features that meet all standards, *plus!*

R&S custom-built panelboards composed of standard enclosures factory assembled, wired, sealed and tested, offer many advantages over special designs and field assemblies.

WRITE FOR CATALOG H-47-4



Explosion-proof, Factory Assembled, Wired and Sealed Panel, Class I, Group D.

D2

RUSSELL & STOLL

RUSSELL & STOLL COMPANY, INC. • 125 BARCLAY STREET, NEW YORK 7, N. Y.

PRECISION-BUILT ELECTRICAL EQUIPMENT—SINCE 1902

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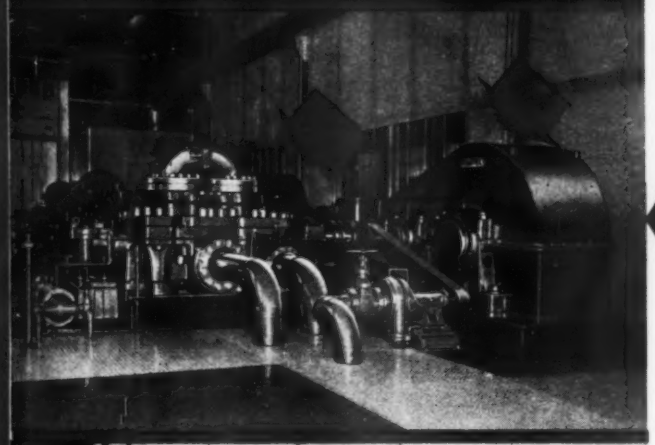
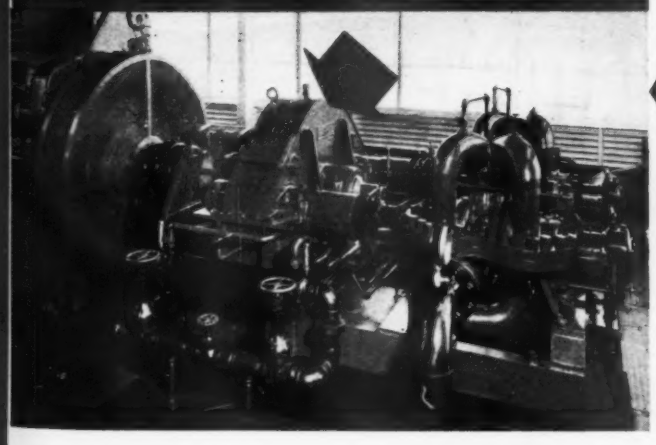
XUM

SUPPLYING THE IDEAL SPEED INCREASER FOR THE JOB

is a Farrel specialty





Since 1932, Farrel has worked closely with the oil industry in developing speed increasers to meet normal as well as unusual requirements.

The remarkable performance record of the hundreds of these units now in service has established a virtual guarantee of satisfaction. All of them, including the first installed 19 years ago, are still operating successfully.

Farrel Type SI units were the first speed increasers to be placed on the market in a standard series. The modern SI line consists of 49 standard sizes with speed ratios ranging from 1:1 to 12:1. For higher ratios, units using two sets of gears are supplied with ratio range from 12:1 to 40:1. Two-pinion units, designed to transmit power from a single engine to two pumps, are also available.

For further information, send for a copy of Bulletin No. 448A. No cost or obligation.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N.Y.

Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Detroit, Chicago, Portland (Oregon), Los Angeles, Salt Lake City, New Orleans

FB-659

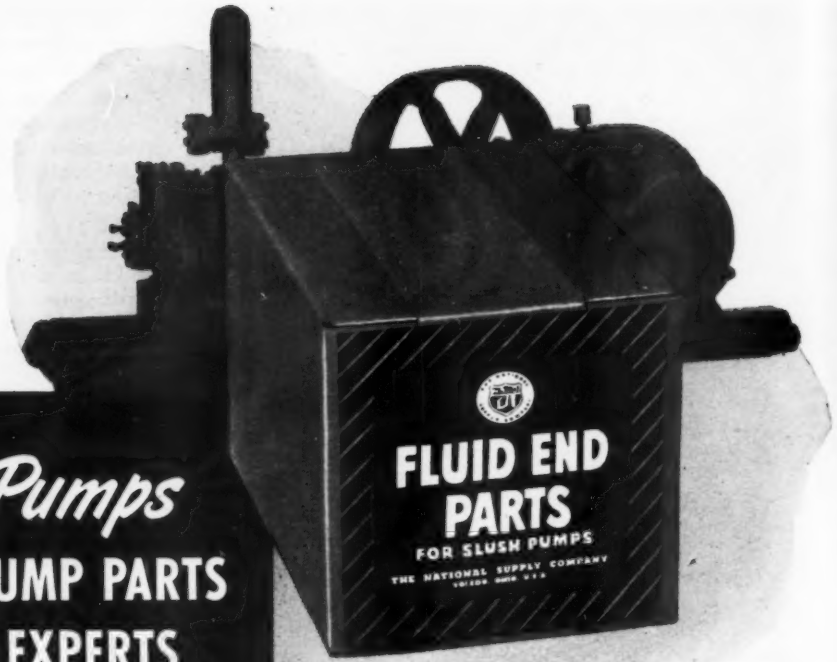
SINGLE STEP-UP UNITS
transmitting 300 HP from internal combustion engines to centrifugal pumps.

DOUBLE STEP-UP UNITS
transmitting 1300 HP from 240 RPM engines to pumps operating at 3150 RPM.

TWO-PINION UNIT
delivering 300 HP to each of two pumps from a single 600 HP engine.

OIL FIELD REPRESENTATIVES:
Hercules-Lupfer Engine Sales Co., 124 N. Boston St., Tulsa 1, Okla.
V. W. Osborne, 860-A M&M Building, Houston 2, Texas

Farrel-Birmingham®



For all Pumps
IDEAL PUMP PARTS
MADE BY EXPERTS

Lengthen the time between overhauls . . . overhaul your pumps of whatever make with "Ideal" Pump Parts.

You can get "Ideal" Fluid-end Parts for any standard make of pump from your nearest National Supply Store. They're made to exact dimensions and specifications on the same equipment that makes "Ideal" Pumps . . . and by the same expert mechanics, backed by National's 36 years of pump-building experience.

You can't get better, more accurate pump parts than those in the blue-and-yellow-labeled box . . . "Ideal" Pump Parts for practically any make of pump. Ask for bulletin 357-A, listing "Ideal" parts for pumps of all manufacture.

THE NATIONAL SUPPLY COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO

NATIONAL BLUE PRODUCTS

DIVISION OFFICES: CASPER; FT. WORTH; PITTSBURGH; TULSA; TORRANCE.

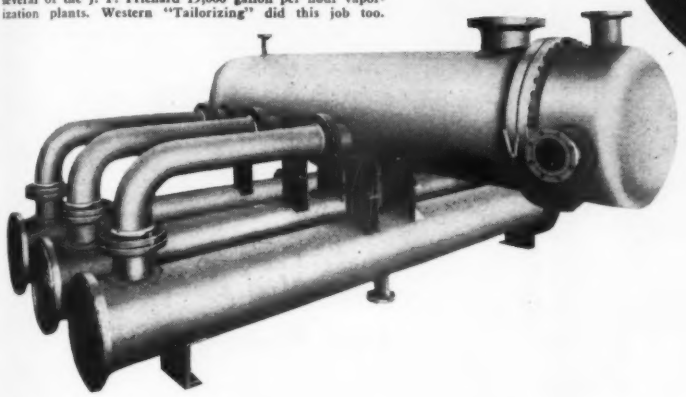
CANADA: THE NATIONAL SUPPLY COMPANY, LIMITED, ROOM 202, ALBERTA BLOCK, CALGARY, ALBERTA.

EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 30 ROCKEFELLER PLAZA, NEW YORK, N. Y., U. S. A.; RIVER PLATE HOUSE, 12 SOUTH PLACE, LONDON, E. C. 2.

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT . . . SPANG PIPE . . . SUPERIOR & ATLAS ENGINES

There's something special even in the little stainless steel exchanger shown here. This was an emergency telephone rush order tailored, fabricated and delivered to the customer by Western in ONLY THREE DAYS.

But take a look at this! A specially designed combination propane-vaporization and super-heating unit employed in several of the J. F. Prichard 15,000 gallon per hour vaporization plants. Western "Tailorizing" did this job too.



LITTLE OR BIG

they're

TAILORED

HEAT EXCHANGERS BY WESTERN

What are your heat exchanger needs? Is your problem a replacement or an entirely new heat transfer installation? Regardless of the situation you face WESTERN has the *answer* in "TAILORIZING". Tailorizing simply means doing the job the way you want it done—fitting design . . . fabrication . . . and installation to the particular set of specifications peculiar to your plant, your operation. So you see—"Tailorizing" just means COMMON SENSE. But that common sense pays off for you—pays off in service and durability, and that means it pays off in good hard cash. Check your operational and maintenance records now . . . look over your heat transfer equipment with an eye on the future. Whether it's shell and tube exchangers . . . reboilers . . . atmospheric sections, the WESTERN technical staff will gladly consult with you on ALL your heat exchanger needs. Complete reports on our facilities and operational methods are available upon your request. We solicit your inquiries.

WESTERN
HEAT EXCHANGERS

Manufactured by

WESTERN SUPPLY COMPANY

P.O. BOX 1888 TULSA, OKLAHOMA

SALES OFFICES — DALLAS — HOUSTON

SEE OUR CATALOG IN SWEET'S

PROVIDED FOR YOUR CONVENIENCE

SEE OUR CATALOG IN REFINERY CATALOG

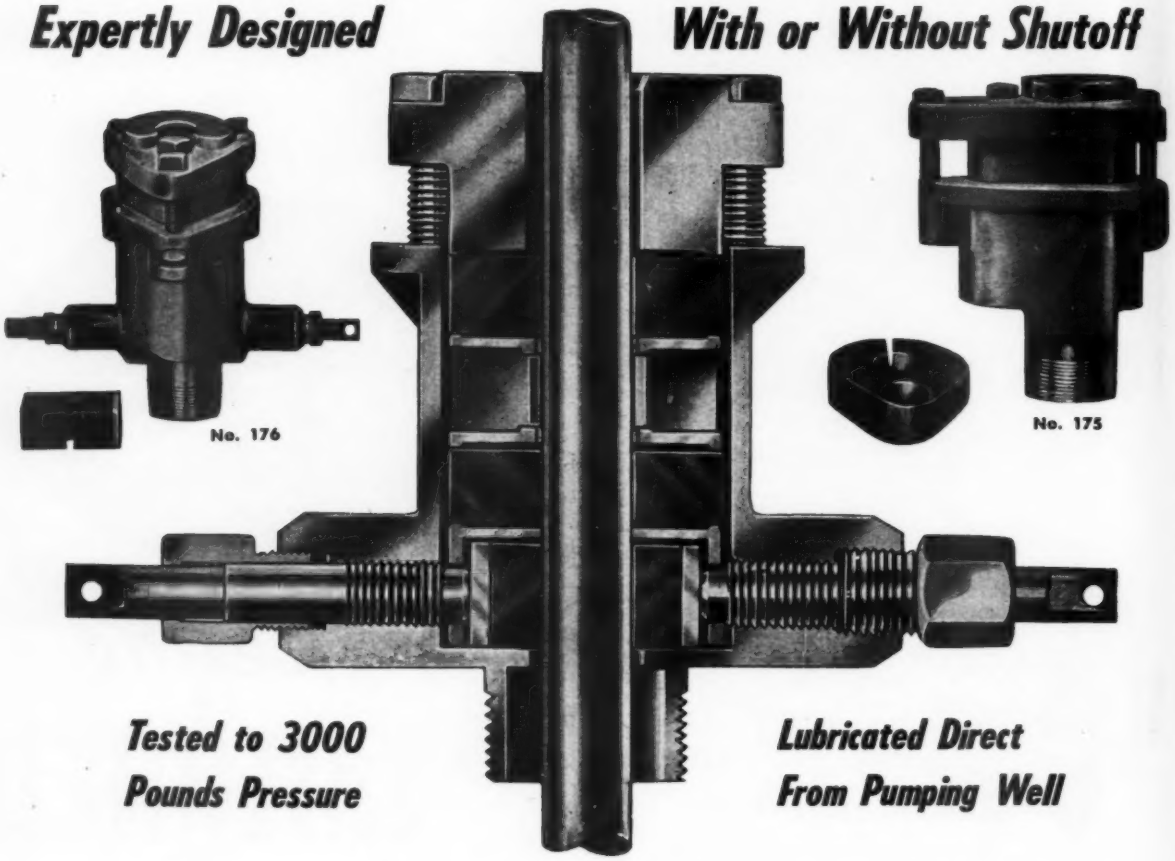
SALES REPRESENTATIVES

TRIDENT ENGINEERING COMPANY
16 Beale St., San Francisco, Calif.

JACKSON ENGINEERING COMPANY
6144 Ferguson Dr., Los Angeles, Calif.

RATIGAN STUFFING BOXES

Expertly Designed *With or Without Shutoff*



Tested to 3000 Pounds Pressure

Lubricated Direct From Pumping Well

Advanced design and engineering of Ratigan Stuffing Boxes greatly increase safety and efficiency in oil field service. They are made of high grade electric steel and tested to 3,000 pounds pressure, and are the only self-oiling boxes on the market, receiving their lubrication directly from the pumping well. The inside of the box is removable, so that the device has two oil chambers. Another arrangement inside the body keeps these chambers filled with fluid from the well, providing positive self-lubrication without depending on the human element.

Ratigan No. 175 and No. 176 Stuffing Boxes are identical except that the No. 175 has no shut-off feature. The No. 176 can be shut off while repacking the box, by tightening the screws evenly in the shut-off; but caution must be exercised, as the screws will have to be loosened before the well starts to pump. If not, the fluid will not get up into the stuffing box. The hole in the rubber is the size of the polished rod, while the hole in the metal parts of the body is larger, making the rod self-aligning . . . an important feature.

When the screws are not tight against the rubber, the stuffing box is free to function properly. For a further check on the fluid coming up through the bypass, the pumper may loosen the plug in the cap a little, and if the bypass is free the oil will flow immediately. If the oil does not come through, the screws in the shutoff are too tight. When repacking Ratigan Stuffing Boxes, both rubbers must be replaced. Instructions for installing are supplied to oil companies and supply stores on request, and are attached to all foreign shipments. When ordering, specify size and type of thread, and size of polish rod.

Ratigan Products Are Illustrated and Described In The Latest Edition of The Composite Catalog

J. P. RATIGAN, Inc.

1213 Santa Fe Ave. Los Angeles 21, California

Export: National Supply Export Corporation
30 Rockefeller Plaza, New York, N. Y.

Ratigan Products Are Sold Through Leading Supply Stores

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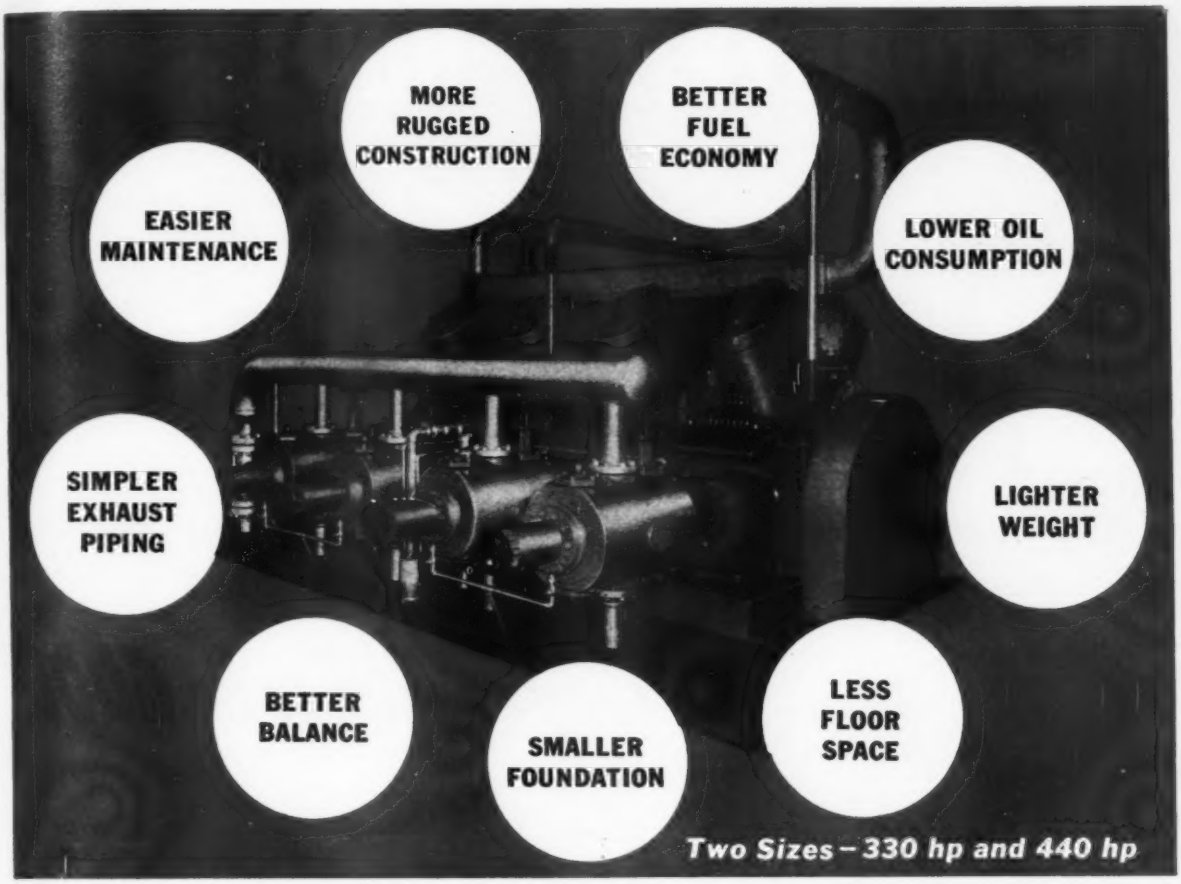
THE NEW, HEAVY-DUTY SVG IS BETTER ALL AROUND



developed for:

ECONOMY
LOW-COST INSTALLATION
FLEXIBILITY
MAXIMUM DEPENDABILITY
QUIET PERFORMANCE
COMPACTNESS
EASE OF OPERATION
EASY RELOCATION

The *new SVG* gas-engine-driven compressor is essentially the well-known XVG 4-cycle V-angle compressor . . . improved and modernized by a complete redesign from the ground up and from the inside out.

For twenty years the famous XVG compressor has maintained its position as a standard of comparison. Time after time new developments were incorporated into the XVG construction, but there are limits to improving an existing model. There comes a time when a departure from even such a successful model is necessary.

The *new SVG* retains all of those features that have been so successful in the XVG, and takes advantage of new materials, modern rotative speeds, up-to-date manufacturing methods, and "know-how" based upon many years of experience in building both compressors and engines. The *new SVG* is the modern-design gas-engine-driven compressor with an outstanding background . . . a better compressor, all around.

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

Here's the complete line of I-R Gas-Engine-Driven Compressors

TYPE JVG — 110, 165, 220 hp
TYPE SVG — 330, 440 hp
TYPE KVG — 660, 880, 1100, 1320 hp

Also companion Gas Engines

4-CYCLE

576-6

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STURDYBILT HOUSES

They've GOT to be GOOD

Many of the largest oil companies all over the nation rely on STURDYBILT Prefabricated oil field buildings. These buildings have GOT TO BE GOOD to satisfy their customers that reorder time and again. STURDYBILT houses *are* good. They're manufactured with care, and designed to last. Order STURDYBILT houses for any oil field housing need.

MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

STURDYBILT

SOUTHERN MILL & MANUFACTURING CO.

Tulsa, Oklahoma

Prefabricated, Demountable Houses

PREFABRICATED HOME MANUFACTURERS' INSTITUTE phmi

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125-45 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

A gearturbine built to save...

Three ways

The Westinghouse Gearturbine costs less to buy . . . less to install . . . and less to maintain. Wrapped up in a single package is a compact, rugged and reliable speed-reduction unit solidly coupled to a Type E turbine. It's the ideal combination for ratings up to 500 hp and output speeds commonly found in single-ended applications.

Here's economy made possible by a standardized design that cuts manufacturing costs . . . avoids costly specials . . . saves space . . . and simplifies maintenance. And you get the maximum flexibility possible . . . any combination of three turbine wheel sizes, three gears and three types of governor can be used according to your needs.

Other plus features are . . . solid coupling of turbine shaft to pinion shaft; single-helical gearing; forced circulation, filtered oil; and 3-point support for easy mounting and leveling.

J-50521

GET THE FULL STORY. A newly available booklet, B-4346, clearly explains the applications, refinements and advantages of Westinghouse Gearturbines. Ask your nearby Westinghouse representative for your copy, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE... IF IT'S
Westinghouse
TYPE E Turbines

Proven Through Extensive Use in the Permian Basin—

For HYDRA-FRAC

For ACIDIZING

For DUAL COMPLETIONS

For GAS or WATER INJECTIONS

SOLD THRU SUPPLY STORES

THE WILSON TYPE "MB" Metal Block PACKER —with Hold-Down

Here is a combination tool that is really getting the job done in West Texas.

For Hydro-Frac, Acidizing, Dual Completions and Gas or Water Injections—the Wilson Type "MB", Metal Block Packer, with Hold-Down is proving to be in a class by itself in giving satisfactory service under most difficult conditions.

The Wilson Type "MB" Packer with Hold-Down is "Full Opening"; it will *hold*, regardless of how low the well is swabbed and will hold a high differential from underneath, assuring an efficient Acidizing or Hydro-Frac job.

This tool is *SOLD*, not rented, therefore it is not necessary to kill your well after completing job.

To pull packer it is only necessary to equalize tubing and casing pressure. The Hold-Down slips cannot lock against the casing because the taper on the Slip Cone is pulled away from the slips as the tubing is raised.

The Wilson Type "MB" Packer cannot *Cold FLOW*, regardless of how great the Hydrostatic Head.

●

This is an outstanding development in Packer design and construction. It will save you time and money to run the Wilson Type "MB" Packer with Hold-Down.

●

— write —

WILSON FOUNDRY & MACHINE CO.

1417 Elysian St.

HOUSTON, TEXAS

in the CASE AGAINST CORROSION

Corrosion like this costs the petroleum industry millions of dollars each year. You've seen the ugly evidence a thousand times — engines that have rusted away hours of useful life, derricks, oil storage tanks, drilling equipment. Every piece of your equipment made of metal is subject to the ravages of rust.

Rust-Ban protective coatings offer you a practical defense against corrosion. There is a proven Rust-Ban coating for every piece of your equipment. Field tests show Rust-Ban cuts maintenance costs and lowers the frequency of equipment replacement — you save first cost many times over.

RUST-BAN 274 and 295 are designed to protect oil storage tanks and other metal structures. Rust-Ban 274 is a fast-drying zinc chromate primer and Rust-Ban 295 is a high-quality aluminum finish.

RUST-BAN 330 is perfect protection for equipment to be stored. Good for machined parts or threads.

RUST-BAN 331 gives interior and exterior protection for precision machinery. Comes off easily upon application of a petroleum solvent.

RUST-BAN 623 is ideal for lay-away protection of all types of internal combustion engines.

These are typical uses of five of the many Rust-Bans. Technical service engineers of any Rust-Ban distributor stand ready to offer specific recommendations for the protection of your equipment.

RUST-BAN

REG. U. S. PAT. OFF.

RUST-BAN MARKETERS

Humble Oil and Refining Co., Houston, Texas
Standard Oil Company (Kentucky), Louisville, Ky.
Penola Oil Co., Chicago, Ill.
The Carter Oil Company, Denver, Colo.
Esso Standard Oil Company, New York, N. Y.

Cut Metering Costs for Gas-Oil Ratios ...Without Cutting Corners

Measuring gas from Separator Batteries at Conoco Driscol Field, Benavides, Texas with 3 Foxboro Gas Flow Meters Type 4.

HERE'S THE WAY IT'S DONE

By taking advantage of the exclusive features built into Foxboro Flow Meters, you can cut meter inspection trips and recalibration to the bone . . . *and eliminate mercury losses completely*. You won't need to coddle these meters to get accurate records.

Foxboro Flow Meters are designed with a *unique straight-line linkage* that makes factory adjustments permanent. Their sustained accuracy is outstanding. Four to six years' service without recalibration isn't uncommon! In addition, floats of Foxboro Meters are *extra large* and have *extra long* travel. This means unequalled power . . . giving highest accuracy at the pen. *Sure-Seal Check Valves*, submerged in mercury, positively prevent mercury losses. And for freedom from friction and freeze-ups, Foxboro Pressur-Tite Bearings have never been equalled!

These are the reasons why experienced production men prefer Foxboro Flow Meters above all others . . . why you can cut metering costs without jeopardizing the accuracy of your records.

WRITE FOR Bulletin 351-2 for complete details.

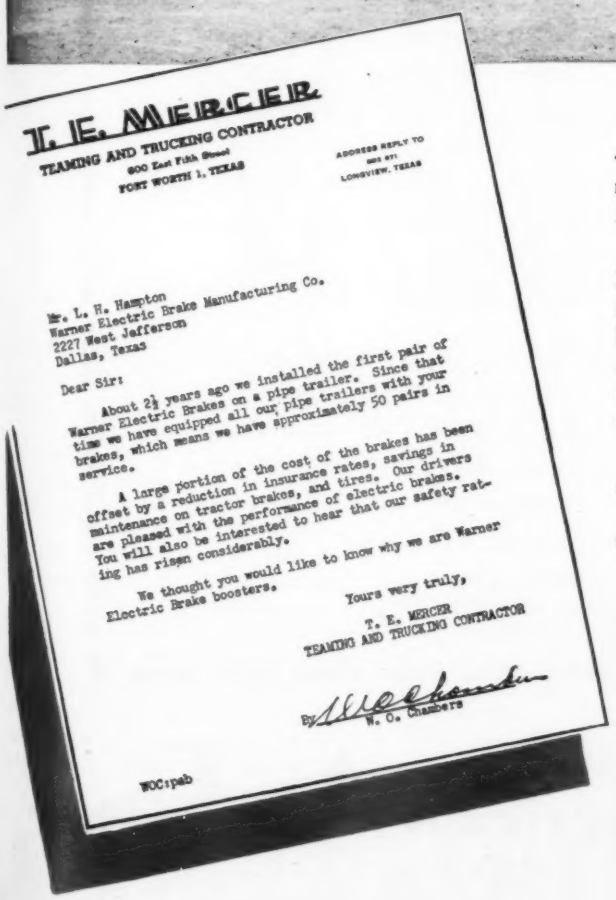
The Foxboro Company, 604 Neponset Avenue, Foxboro, Mass., U.S.A.

FOXBORO REG. U. S. PAT. OFF.

MONEY-SAVING FLOW METERS

USER REPORT:

T. E. Mercer Equips Fleet with Warner Electric Brakes. Reports Savings in Maintenance on Brakes and Tires . . . reduced Insurance Rates . . . Improvement in Safety Rating



T. E. MERCER
TEAMING AND TRUCKING CONTRACTOR
600 East Fifth Street
FORT WORTH 1, TEXAS

ADDRESS REPLY TO
BOX 871
LONGVIEW, TEXAS

Mr. L. H. Hampton
Warner Electric Brake Manufacturing Co.
2227 West Jefferson
Dallas, Texas

Dear Sir:

About 2½ years ago we installed the first pair of Warner Electric Brakes on a pipe trailer. Since that time we have equipped all our pipe trailers with your brakes, which means we have approximately 50 pairs in service.

A large portion of the cost of the brakes has been offset by a reduction in insurance rates, savings in maintenance on tractor brakes, and tires. Our drivers are pleased with the performance of electric brakes. You will also be interested to hear that our safety rating has risen considerably.

We thought you would like to know why we are Warner Electric Brake boosters.

Yours very truly,

T. E. MERCER
TEAMING AND TRUCKING CONTRACTOR

By W. O. Chambers

WOC:pab

A NEW user — or an old customer — their opinions about Warner Electric Brake performance, safety, maintenance are always the same. The experience of Mr. Chambers of the T. E. Mercer Company is typical.

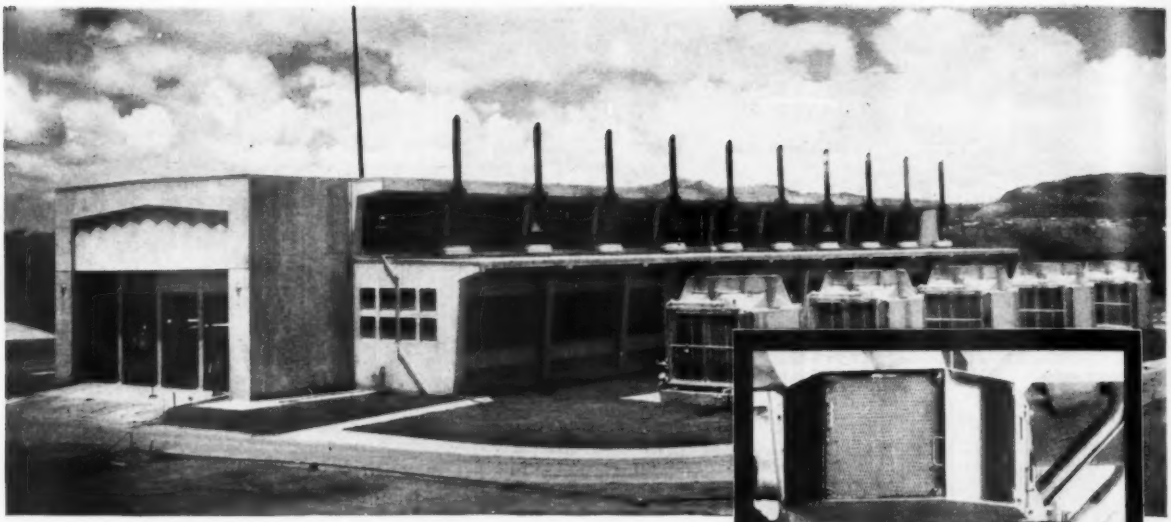
Warner Electric Brakes are fast and positive acting. Because they operate *electrically*, they give faster action and braking control not possible with any other kind of brakes. What's more, their mechanical simplicity and rugged construction make them extremely economical to maintain. Many users are still operating Warner Electric Brakes originally purchased 10, 15 and 20 years ago!

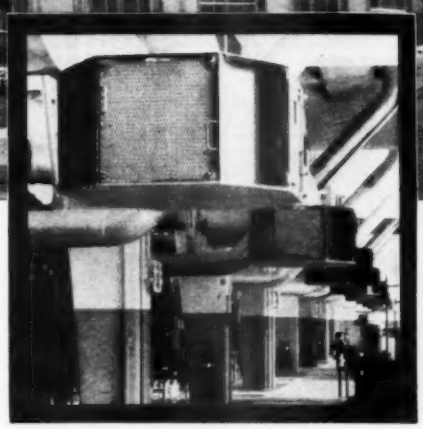
Write for illustrated literature explaining their many advantages.

WARNER ELECTRIC BRAKE & CLUTCH CO.
Dept. OGJ, BELOIT, WISCONSIN

WARNER
ELECTRIC BRAKES

SINCE 1927





NAVY *Scuttles Dust* with AAF Filters

Type "OC-H" FILTERS Provide Defense For Twenty Diesel Generators On Guam

Since 1948 the Navy has consolidated its scattered power generation operations on Guam with the installation of two 10-generator stations. Main illustration above shows exterior view of the modern station at Agana. Inset shows interior view of the duplicate installation at Orote and the AAF Type "OC-H" Filters which are installed on the air intake of each 1000 hp Diesel generator.

Dust is the sworn enemy of such equipment and, if given the opportunity, can quickly lead to permanent damage, costly repairs and untimely shutdowns. With AAF Filters standing 24-hour guard, these engines are safe. The type "OC-H" is a low cost, washable, unit-type filter which offers low resistance to air flow, high cleaning efficiency and large dust-holding capacity.

Whether your operations are located in a desert, dust bowl or industrial district, AAF has a filter of a type and capacity that will provide positive dust protection for your engines or compressors. Write today for complete catalog information.

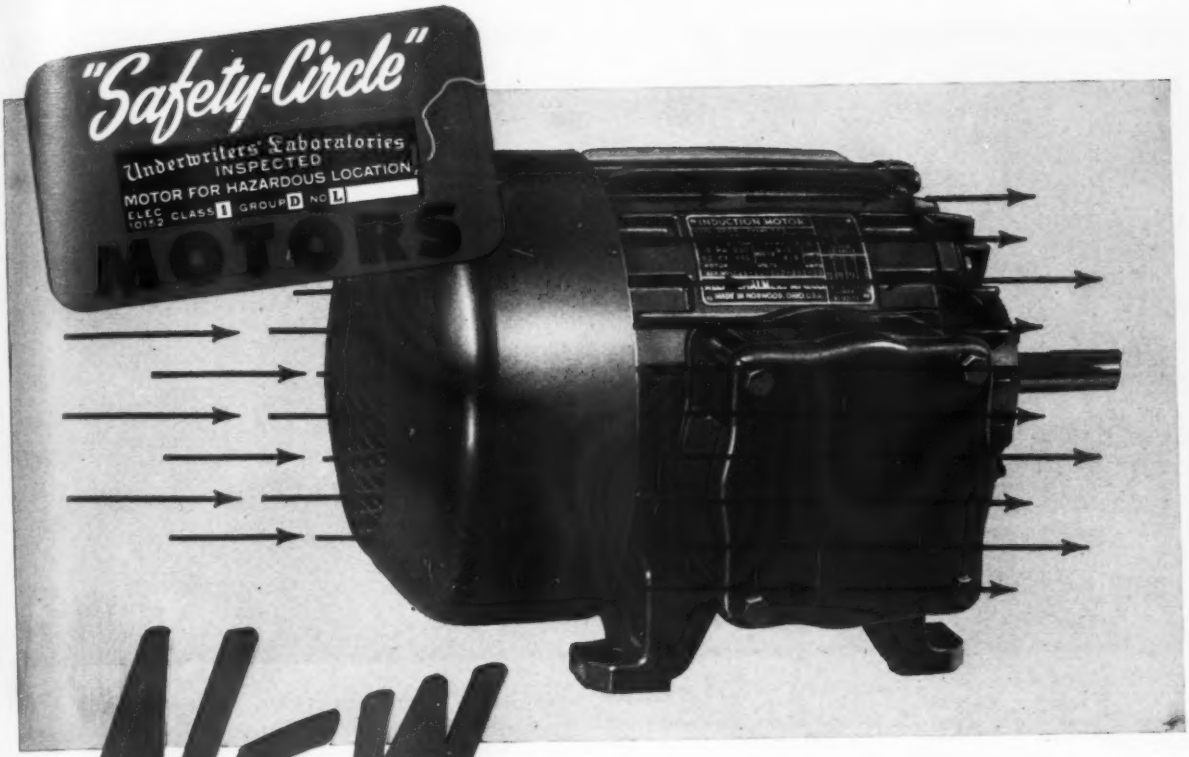
Today's Best Buy is Better Air!

AAF

American Air Filter

COMPANY, INC.

444 Central Avenue, Louisville 8, Kentucky · Darling Bros., Ltd., Montreal, P. Q.



NEW Easy to Clean Resists Corrosion

CORROSIVE ATMOSPHERES CAN'T HURT this Allis-Chalmers Type APZZ explosion-proof motor because major parts are enclosed in a rigid cast iron frame! No extra treatment is needed and cast iron's corrosion resistance won't chip off.

Lower Maintenance, Too

No corners, pockets or hidden air passages to collect dirt. Cleaning is the simplest of maintenance operations. Just blow the dirt off the outside of the motor with an air hose. Fan and housing design keep cooling air-flow tight against the yoke so dirt does not accumulate and cleaning is seldom required.

Factory Lubricated Bearings

Bearings are lubricated at the factory and should need no attention for years. Extra rigidity of the cast iron frame holds bearings in alignment under all operating conditions. This gives long bearing life and low operating costs.

Get All The Facts

The new *Safety Circle* explosion-proof motor is built in NEMA standard frame sizes from 224* to 505. Call your nearest Allis-Chalmers Authorized Dealer or Sales Office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for bulletin 51B6144.

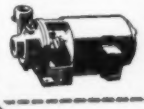
A-3264

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.



PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Safety Circle, *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors, Type APKK, also available in frames 203 to 224 inclusive.

The *S. S. Jahra* on her delivery trials.

Supertankers for Superservice

The *S. S. Jahra,* first of more than a score of 28,000-ton supertankers constructed by Bethlehem shipbuilding yards for private interests in the past two years, is an outstanding example of Bethlehem's ability to design and construct ships to meet the specific requirements of the individual operator or of an entire industry.

These vessels represent fulfillment of the petroleum industry's need for big, fast, highly-efficient carriers capable of transporting oil products to and from the far-flung corners of the globe on a low-cost basis.

Fully representative of American postwar shipbuilding skill and achievement, these supertankers can be expected to provide many years of high-standard and low-cost service for their operators, because they have all of the inherent characteristics which for almost half a century have distinguished every ship bearing the title, "Bethlehem-Built."

MAIN PARTICULARS OF THE S. S. JAHRA

Length, overall	624 ft. 9¾ in.
Length, between perpendiculars	595 ft. 0 in.
Breadth, molded	84 ft. 0 in.
Depth, molded	44 ft. 0 in.
Draft, molded	33 ft. 0 in.
Deadweight, tons	28,300
Cargo capacity, bbls.	240,400
Shaft horsepower, max.	13,750
Speed, fully loaded, about	16½ knots

SHIP REPAIR YARDS

Boston Harbor	New York Harbor
Baltimore Harbor	Beaumont, Texas
Los Angeles Harbor	San Francisco Harbor

SHIPBUILDING YARDS

Quincy, Mass.	Staten Island, N. Y.
Sparrows Point, Md.	Beaumont, Texas
Terminal Island, Calif.	San Francisco, Calif.

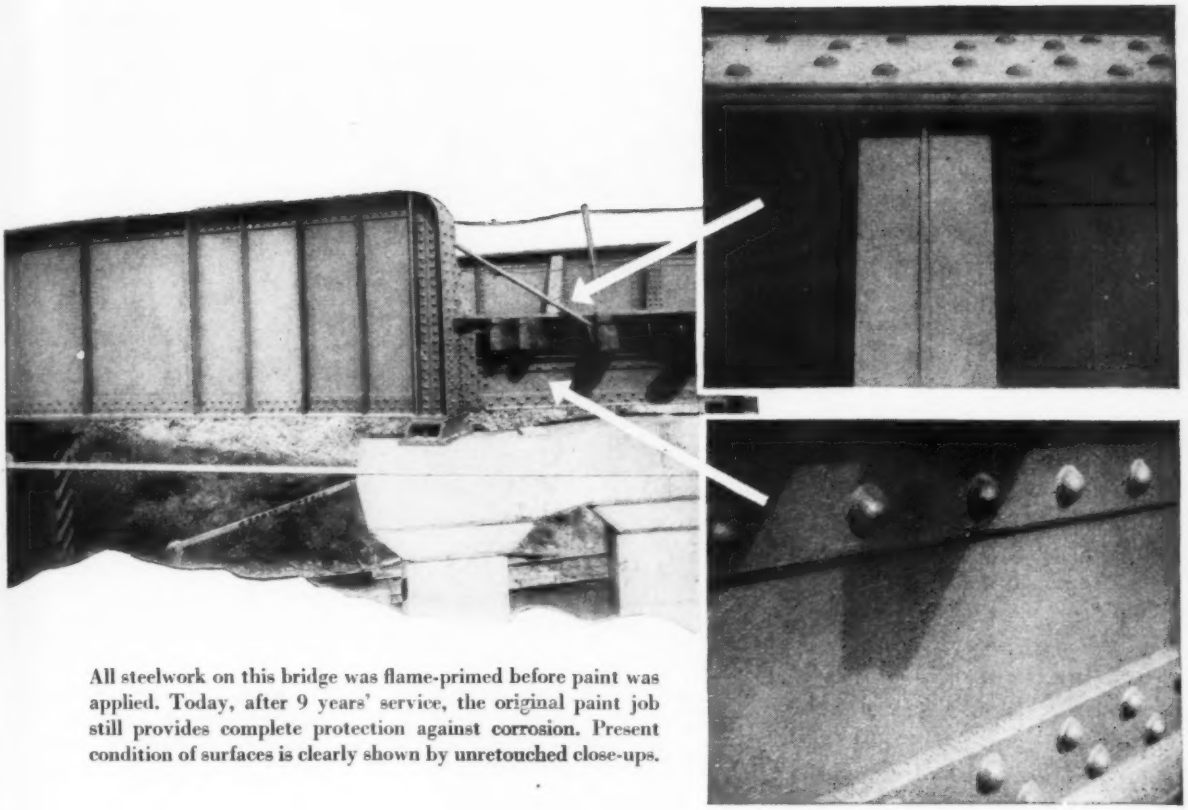
SHIPBUILDERS *SHIP REPAIRERS*

BETHLEHEM STEEL COMPANY

Shipbuilding Division

General Offices: 25 Broadway, New York 4, N. Y.

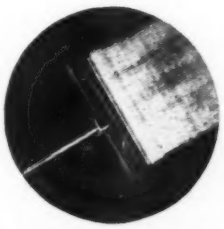
On the Pacific Coast shipbuilding and ship repairing are performed by the Shipbuilding Division of Bethlehem Pacific Coast Steel Corporation



All steelwork on this bridge was flame-primed before paint was applied. Today, after 9 years' service, the original paint job still provides complete protection against corrosion. Present condition of surfaces is clearly shown by unretouched close-ups.

Your Steelwork . . .

How Will It Look in 1960?



Steelwork you coat with good paint today can still look like new ten years from now, *if you flame-prime all exposed surfaces first.* And what you'll save on maintenance, because of increased protection due to flame-priming, will more than pay for all the flame-priming apparatus and materials you need for the job.

Flame-priming is simple to do, requires little equipment, and costs little. A brush of oxy-acetylene flames pops off scale and drives out moisture. Paint applied to the warm, dry surface goes on quickly and smoothly, bonds tightly, and lasts longer.

Flame-priming is one of many time- and money-saving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost.

To find out, without obligation, telephone or write our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

Linde Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, AND FORMING METALS

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

ANNOUNCING
A BRAND NEW CATALOG
FOR BONNEY WELDOLETS

Contains complete and up-to-the-minute catalog information on all types of Weldolet welding fittings available. Presents a full range of sizes and schedules, introducing many new applications, together with simplified data on the determination of code requirements. To get your copy of this catalog, write . . .

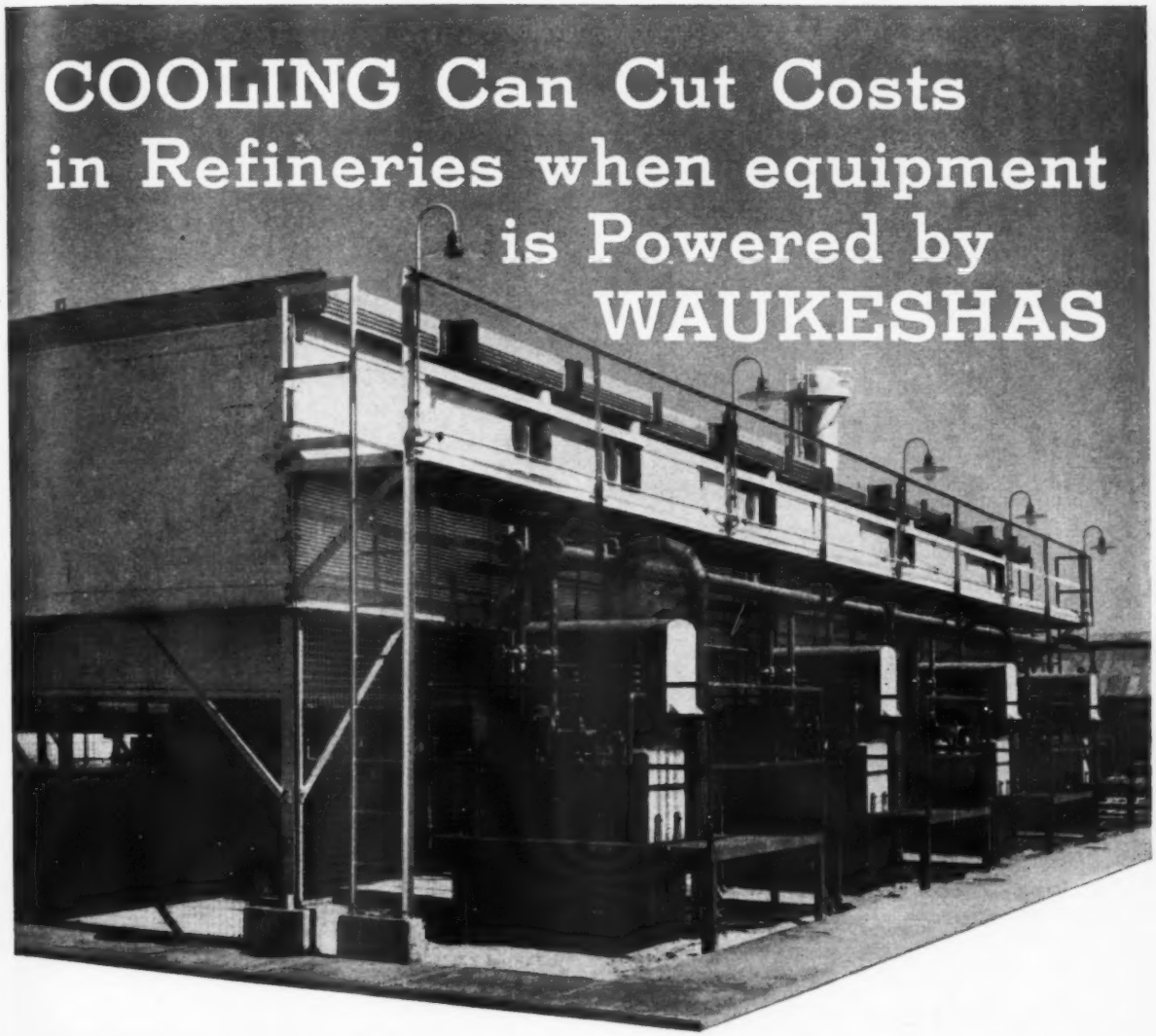
BONNEY FORGE & TOOL WORKS
366 Green Street, Allentown, Pa.

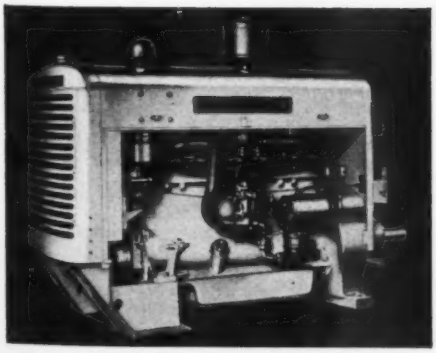
Export Distributor
NATIONAL SUPPLY EXPORT CORP.
30 Rockefeller Plaza, N. Y.

WELDOLETS

WELDING FITTINGS FOR ANY PIPING SERVICE

COOLING Can Cut Costs in Refineries when equipment is Powered by WAUKESHAS





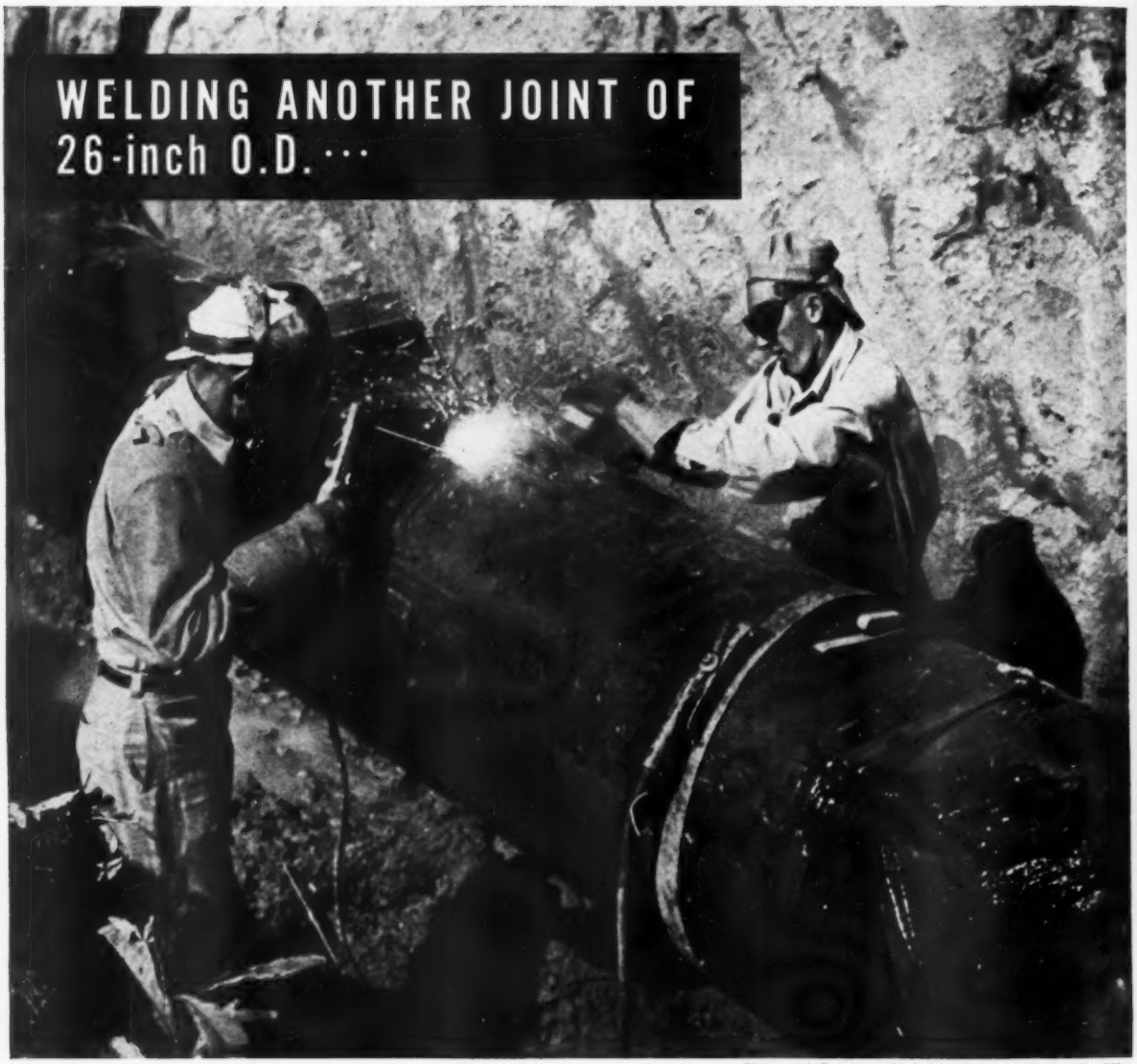
Waukesha 190-GLU Oil Field Gas Power Unit
6-cylinders, 3¾-in. x 4-in. stroke. 265 cu. in. displ.

● Keeping cooling costs low, in the refinery—that's the job all these Model 190-GLU Waukesha Gas Power Units are doing here. A compact and power-packed six is the 190-GLU, with overhead valves and wet cylinder sleeves. Designed for dependability... better-built for durability—it's an oil field engine all the way. And rugged in every way—from oil pan to cylinder head. Crankcase and cylinder block are cast as a unit for structural rigidity that keeps all bearings and moving parts in alignment. Wet cylinder sleeves are renewable—every wearing part is replaceable at low cost and with the least possible trouble. This engine is a lifetime investment. Bulletins 1453 and 1472 tell all the many other reasons why.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN
NEW YORK TULSA LOS ANGELES

122

WAUKESHA *Gas Power* *Diesel Power*..... POWER



Photograph Courtesy of H. C. Price Company, Bartlesville, Okla.

CF&I STEEL

WELDED STEEL PIPE

It field-welds easier and more uniformly, because the high tensile strength carbon-silicon steel plates used in its manufacture have a low carbon and manganese content. And, these high quality plates are produced entirely within our own plant, under the supervision of skilled craftsmen.

Available in 40′ lengths and 24″ through 36″ O.D. Write for detailed information.

FLANGED AND DISHED HEADS • CARBON AND STAINLESS-CLAD STEEL PLATES
LARGE DIAMETER WELDED STEEL PIPE

SUCCESSOR TO THE WORTH STEEL COMPANY

CLAYMONT STEEL CORPORATION • Claymont, Delaware
a subsidiary of CF&I—THE COLORADO FUEL & IRON CORPORATION

Mighty Midgets

SHOWN ACTUAL SIZE

Left to right: Rockwell 24 hour wind and 8 day wind midget mechanical drives with rotation-converting Turret that, on the eight day model, permits one basic drive to be adapted to as many as 11 different speeds.

dependable, convenient drives for Meters, Controls, Recorders

THE TURRET ON TOP *does the trick!*

The above illustration shows how Turrets lock onto the chart arbor of the eight day model to change rotation speeds. The eight day drive is basically 24-hour rotation. Turrets are available for chart rotation times of 2, 3 4, 6, 8, 12 and 48 hours; 3, 7 and 8 days.

THE **MOST** CHART DRIVE IN THE **LEAST** SPACE

Rockwell Midget Chart Drives fill the need for compact, powerful mechanical drives in instruments where space is at a premium. They are strongly constructed with cases of die cast aluminum, gears mounted in phosphor bronze bearings and an escapement case made of stainless steel and clear plastic. This escapement snaps into place without tools and is readily replaceable.

Rockwell Midgets wind through the chart arbor. They snap into a separate mounting ring only 3¼" in diameter which may be positioned on bosses or adaptors to fit any instrument case.

This combination of small size, versatility of application and precision construction makes Rockwell Midgets the most economical drives to use. It will pay you to specify them in instruments made by any manufacturer.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA.

Atlanta • Boston • Chicago • Columbus • Houston • Kansas City
Los Angeles • New York • Pittsburgh • San Francisco • Seattle • Tulsa

ROCKWELL CHART DRIVES

AT SUN'S NEWEST REFINERY..

Sun Oil Company's new cat cracker at Toledo, Ohio

Reaching twice as high as the Statue of Liberty, this 308-foot Houdriflow unit forms the heart of Sun's newest refinery. It can produce 600,000 gallons of New Blue Sunoco gasoline daily, plus other products, doubling the capacity of the Toledo plant.

OIC Valves are at work in many strategic points throughout this refinery. They give efficient, precise control because they're—

PRECISION ENGINEERED—positive closure ...minimum friction...designed for smooth, free flow. PRECISION BUILT—every essential part accurately finished for a precise fit, on the most modern production equipment. PRECISION APPLIED—OIC engineers will assist in selecting valves to suit each job, at lowest cost.

For a free copy of the 1950 OIC Valve Cross-Reference Chart, see your local distributor or write us direct. The Ohio Injector Company, Wadsworth, Ohio.

OIC
FOUNDED 1883

VALVES

FORGED AND CAST STEEL · IRON · BRONZE

WANT TO REDUCE OIL CONSUMPTION?

Let Pedrick help you in this and other piston ring problems

WITH higher compression, greater heat and increased power, today's engines sometimes show a tendency to burn more oil because of block distortion.

In many cases Pedrick has been able to help substantially in solving this problem. Pedrick engineers have developed oil rings with an amazing degree of conformability . . . rings that prevent excessive oil consumption for an exceptionally long period, while still admitting ample oil for top cylinder lubrication. In addition, Pedrick's exclusive "Heat-Shaping" process insures correct distribution of radial pressure in compression rings, thus keeping cylinder wear to a minimum.

Pedrick engineers will be glad to work with you in reducing oil consumption . . . as well as in other problems, such as scuffing, maintenance of compression, blow-by.

With 31 years of specialization in the piston ring field, Pedrick has the know-how you're seeking as a supplement to your own technical skill.

Address your inquiry to WILKENING MANUFACTURING Co., Philadelphia 42, Pa. *In Canada:* Wilkening Manufacturing Co. (Canada) Ltd., Toronto.

FOR 31 YEARS, SUPPLIER OF PISTON RINGS TO LEADING VEHICLE AND ENGINE MANUFACTURERS

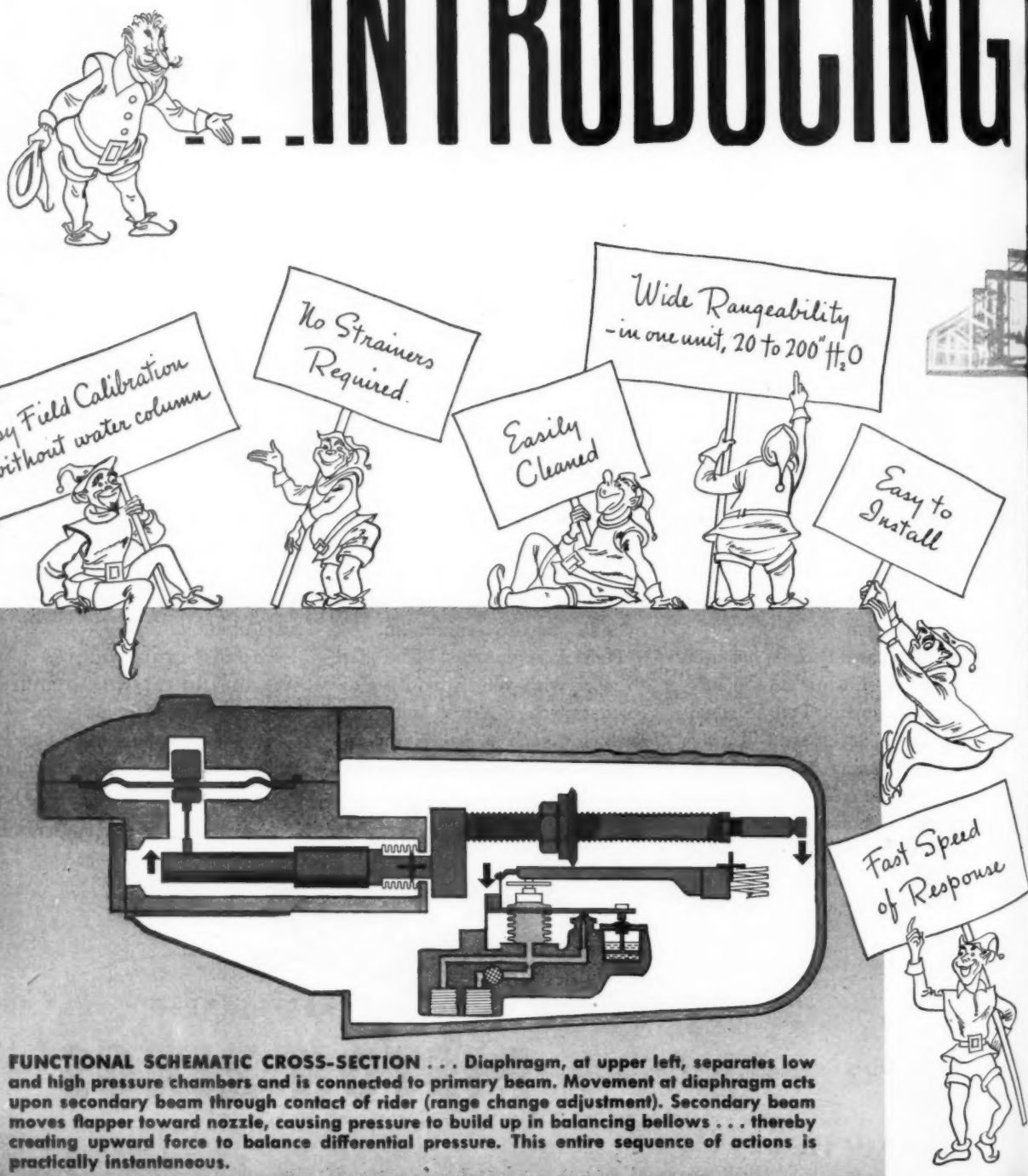
Pedrick®

"HEAT-SHAPED"

PISTON RINGS

A Big Forward Step In The

INTRODUCING


Easy Field Calibration - without water column
No Strainers Required
Easily Cleaned
Wide Rangeability - in one unit, 20 to 200" H_2O
Easy to Install
Fast Speed of Response

FUNCTIONAL SCHEMATIC CROSS-SECTION . . . Diaphragm, at upper left, separates low and high pressure chambers and is connected to primary beam. Movement at diaphragm acts upon secondary beam through contact of rider (range change adjustment). Secondary beam moves flapper toward nozzle, causing pressure to build up in balancing bellows . . . thereby creating upward force to balance differential pressure. This entire sequence of actions is practically instantaneous.

XUM

Measurement and Transmission of Flow

the New BROWN DIFFERENTIAL CONVERTER

(pneumatic-balance flow transmitter)

AFTER long and rigorous testing in the field, the Brown Differential Converter is ready to set new high standards of simplicity and precision in the measurement and transmission of flow.

Operating on the pneumatic-balance principle, this compact and light-weight unit converts differential pressure at the orifice into a proportionate output air pressure which is a measure of flow. All adjustments . . . such as the range change which is continuous from 0-20 inches of water up to 0-200 inches of water . . . are easily and simply made, without special tools or extra parts.

Applicable to a wide range of continuous processes, the Brown Differential Converter is the fore-runner of an entirely new series of pace-setting developments made possible through Brown *Creative Instrumentation*. For detailed information write for a copy of new Catalog No. 2281 . . . and call in our local engineering representative for a discussion of your process needs. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4488 Wayne Avenue, Philadelphia 44, Pa.

MINNEAPOLIS Honeywell

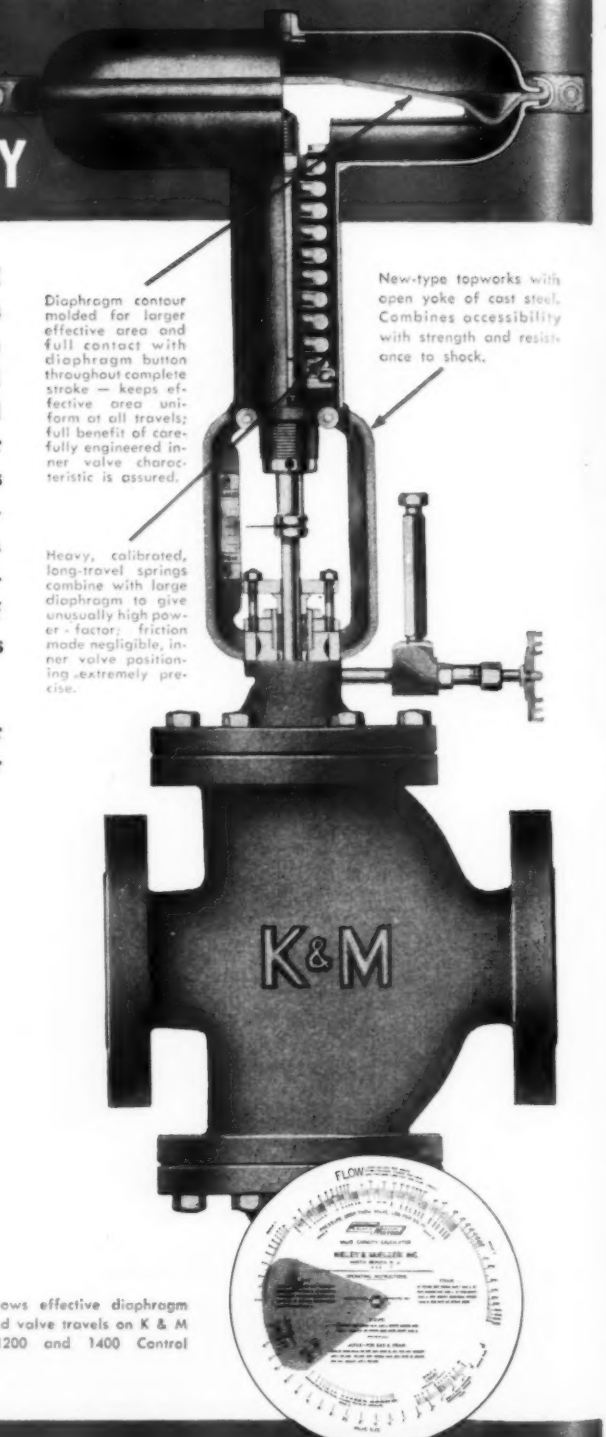
BROWN INSTRUMENTS

XUM

K&M The Control Valves with GREATER POWER for GREATER ACCURACY

The Diaphragm Motor of the far-advanced K & M Control Valve is designed for the more exacting needs of modern process industries. An unusually high power-factor is obtained by the carefully-engineered relationship of large effective diaphragm area and heavy, calibrated spring; friction is negligible, inner valve positioning more precise. The diaphragm is specially designed for constant affinity with the button contour; this assures a uniform effective area throughout the complete valve stroke, thus more uniformly accurate control. The unusually large area of the diaphragm in relation to the valve size also helps assure more precise control.

K & M motors are available for direct action or reverse action without change in effective area or stroke.


Diaphragm contour molded for larger effective area and full contact with diaphragm button throughout complete stroke — keeps effective area uniform at all travels; full benefit of carefully engineered inner valve characteristic is assured.
New-type topworks with open yoke of cast steel. Combines accessibility with strength and resistance to shock.
Heavy, calibrated, long-travel springs combine with large diaphragm to give unusually high power - factor; friction made negligible, inner valve positioning extremely precise.
K&M
FLOW

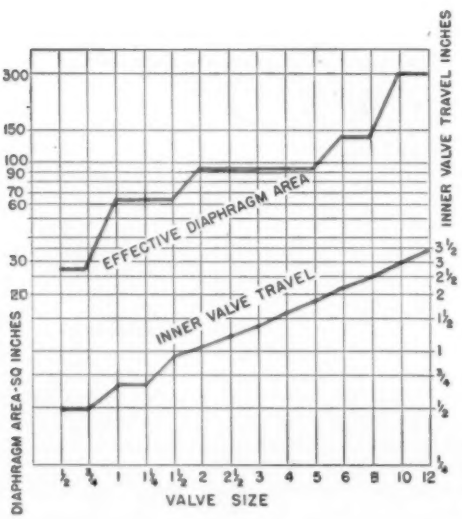


Chart shows effective diaphragm areas and valve travels on K & M Series 1200 and 1400 Control Valves.

KIELEY & MUELLER

Established 1879

1027—43rd Street North Bergen, N. J.

The extremely accurate circular slide-rule type K & M valve capacity calculator includes corrective scales for steam quality, liquid and gas specific gravity and flowing temperature scale for gases. Sent without charge in response to a request on your business stationery.

Tame those touchy hydrocarbons

with a BJ Stuffingboxless Pump

Engineered for safe, simple, economical handling of butane, propane, ethane and other volatile hydrocarbons...

CAN'T ESCAPE

Leakage of pumped fluid to atmosphere is impossible. The motor and close-coupled pump are totally enclosed in a sealed pressure vessel. There's no fire hazard or danger to property or personnel caused by leakage.

ABLE TO CONTAIN HIGH PRESSURES

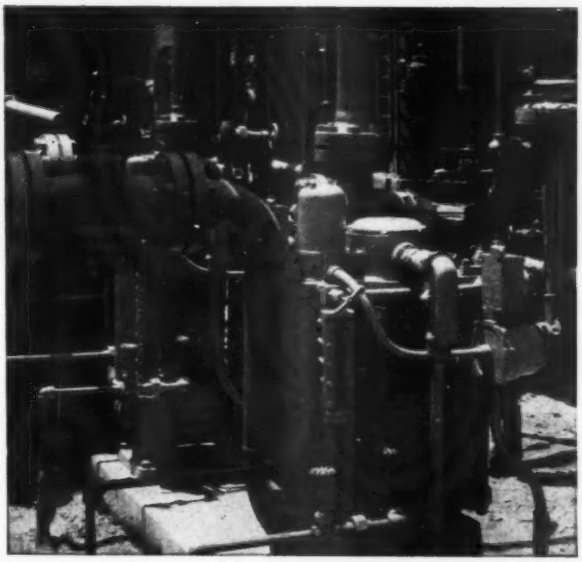
BJ's pressuring system maintains a predetermined pressure across the mechanical seal that separates the motor from the pump within the chamber. This pressure is constant, regardless of suction and discharge pressures.

NO "KEEPER" NEEDED

No special attendant is needed to guard against leakage and consequently no costly maintenance time is spent in repacking and adjusting.

OPERATING SAVINGS

While the first cost of the BJ Stuffingboxless Pump is somewhat higher, big and continuing savings are offered in operation. There's no product loss through leakage, no downtime due to flood-out.



THE *RIGHT* PUMP FOR YOUR JOB

The BJ Stuffingboxless Pump is available in a wide range of models and pressuring system combinations to meet individual requirements. Byron Jackson Co. engineers are ready to help you secure the BJ Stuffingboxless Pump best suited to your job. Write, wire or phone today.

Byron Jackson Co.

Since 1872

Dept. 26, P. O. Box 2017 Terminal Annex
Los Angeles 54, Calif.

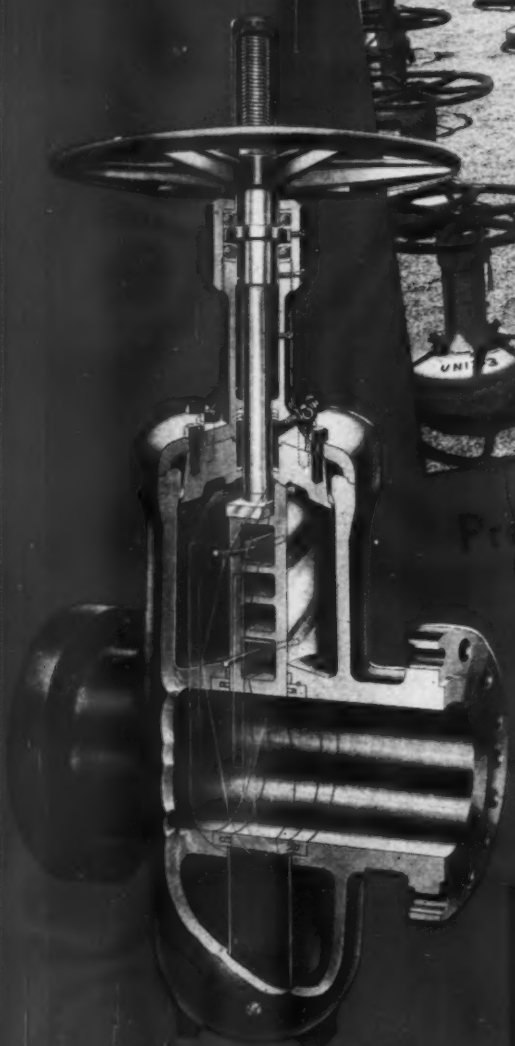
OFFICES IN PRINCIPAL CITIES

THESE BJ STUFFINGBOXLESS PUMPS handle ethane in a de-ethanizing operation. Pumping temperature is 80° F; suction pressure 490 psig; discharge pressure 520 psig; capacity 100 gpm; speed 3550 rpm; total head 165'; and specific gravity 0.42.

XUM

W·K·M... all the way!

W-K-M PIPE LINE VALVE



Preferred because it's DEPENDABLE

Sights like these above . . . pipe lines and stations equipped 100% with W-K-M Pipe Line Valves . . . are becoming more common every day as operators discover the many features of safety, dependability and economy provided by exclusive W-K-M design.

Full opening, with chrome-plated, parallel expanding gates that seal on *both* sides, W-K-M Pipe Line Valves seal positively against oil, gas or finished products; open and close easily; provide absolute top protection under all conditions. Available in Series 300, 400, 600, 900 and 1500, sizes from 2" through 30" in regular or geared models.

Check the many features of W-K-M Pipe Line Valves, compare them with other valves designed for similar services . . . and we believe that you too will specify W-K-M "all the way".

W-K-M Company

OIL FIELD, PIPE LINE & INDUSTRIAL EQUIPMENT

HOUSTON, TEXAS, U. S. A.

LOS ANGELES

Cable Address: WILKOMAC

Export Office: 30 Rockefeller Plaza, New York, N. Y.

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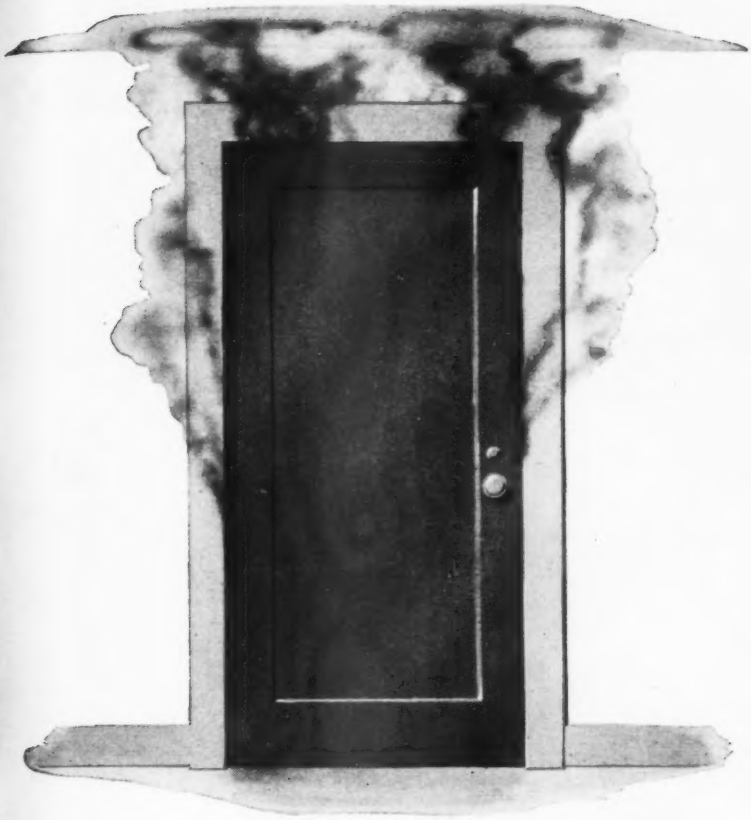


Where is the safest place to keep your documents?

Are your contracts, blueprints, accounts receivable—the records that keep your business going—really safe?

If you've ever seen business papers charred by fire . . . or made illegible by water from fire fighting, you'll want to make sure it can't happen to your records.

Wherever you store these papers, you can rely on a *Kidde* Fire Extinguishing System to protect them. A Kidde System uses carbon dioxide—a gas that won't mark, stain or discolor papers—and it puts out fire *fast*.

You can put a Kidde system on guard over one or many record vaults . . . ready at the first sign of flame to release a fire-smothering cloud of CO_2 . . . and do it *automatically*.

Why not go *all the way* in protecting your papers. Call a Kidde expert for full information.

Kidde

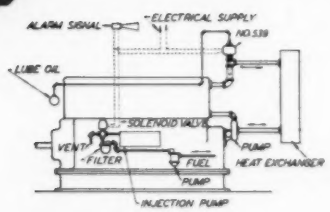
Walter Kidde & Company, Inc., 454 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

Why take chances on engine trouble?

No. 923-3

Depend on SYLPHON controls

No. 539



Typical installation of No. 539.

YOU NEVER NEED to cross your fingers—or trust to luck—with these Sylphon controls. When they're on the job, they safeguard you against engine trouble—day and night. They help ward off costly shutdowns, damage or repairs.

No. 539 control gives positive protection against high jacket water temperature or low lube oil pressure. If water jacket temperature goes above, or lube oil pressure goes below safe limits, it sounds an alarm—or shuts off the engine. Also available for temperature or pressure only.

No. 923-3 Regulator is equally dependable. It thermostatically controls cooling water circulation—keeps engine jacket temperature right. Can be manually operated—if and when desired!

Both controls are ideally suited to diesel, gas or other internal combustion engines. Self-contained and self-powered, they're built to give you long, trouble-free service. Easily installed. For complete information, send for Bulletin HO-817.

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

FIRST WITH BELLOWS

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

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Why... YOU NEED A MULTIPLE SHOT SURVEY!

BY Eastman

22 OFFICES FOR YOUR CONVENIENCE

CONSULT YOUR LOCAL TELEPHONE DIRECTORY FOR OFFICE NEAREST YOU

Eastman . . . famous throughout the world for oil well surveys, offers you a directional survey service which is complete in every detail. An Eastman Multiple Shot Survey is made by precision instruments in either open or cased holes by highly trained and experienced Eastman engineers. These engineers carefully compute each survey and then present a complete and accurate report to the operator.

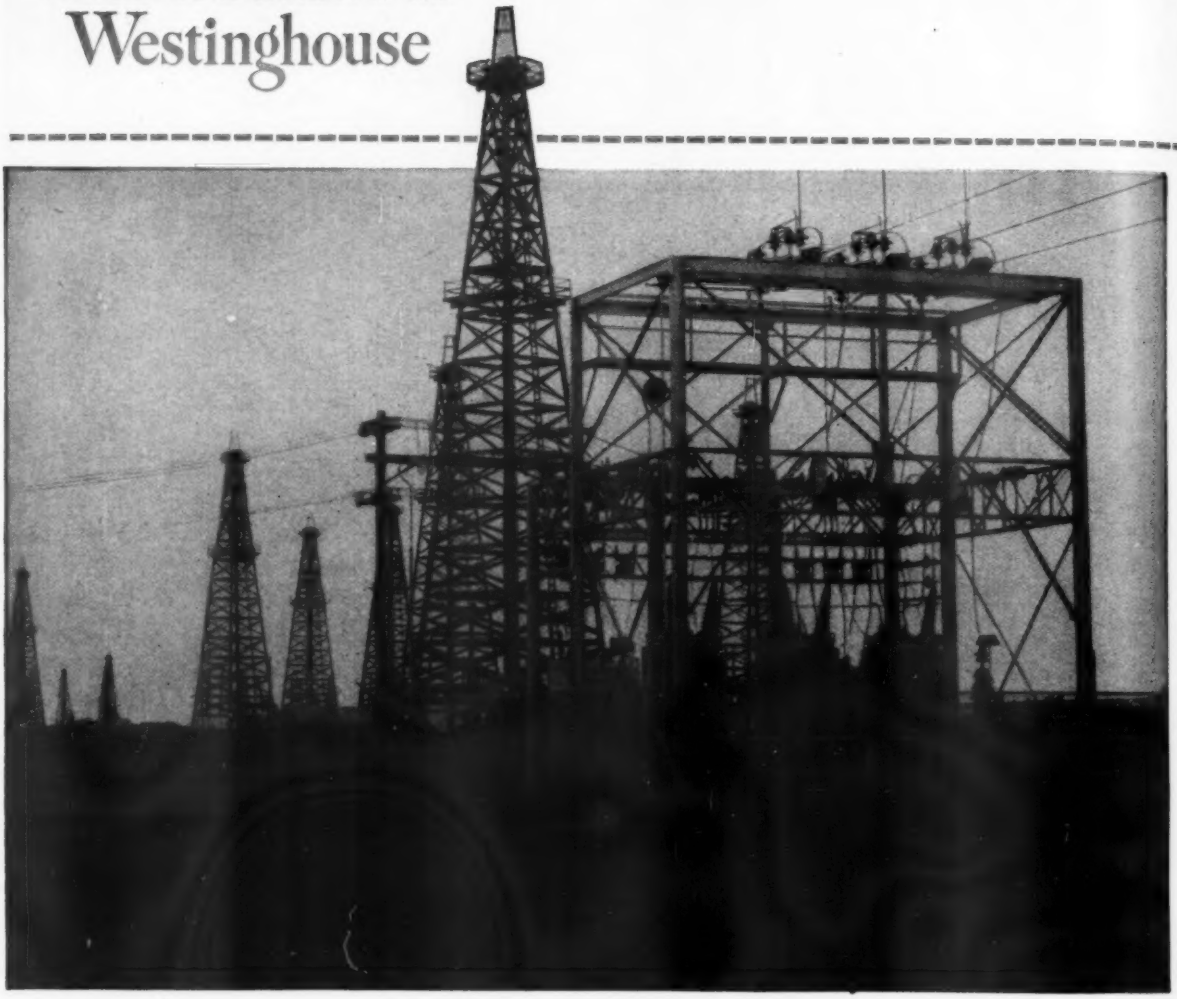
YOU NEED EASTMAN MULTIPLE SHOT SURVEYS FOR . . . . .

1. Insuring a permanent record of the sub-surface course of a well for future operations, such as side-tracking or deepening.
2. Showing the exact location of the bottom of the well bore.
3. Checking for possible dog legs in open holes before casing is run.
4. Establishing court evidence to prevent trespass suits.

EASTMAN OIL WELL SURVEY COMPANY

LONG BEACH • **DENVER** • HOUSTON

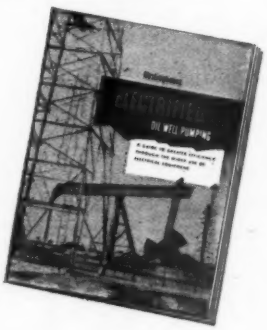
YOU CAN BE **SURE**.. IF IT'S
Westinghouse



GET THIS HELPFUL HANDBOOK ON ELECTRIFIED PUMPING

Here are 48 pages of helpful facts on electrified pumping . . . authoritative information to help you answer such questions as: What size motors should I specify, which type? How about automatic time control? What's the best distribution system for my lease? And a hundred others. It's a typical indication of Westinghouse "know-how" in every phase of oilfield electrification.

If you haven't already received your copy, write for it now. Ask for B-4039. Address: Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penna.



How much can *Electrified Pumping* save for YOU?

In one case on record, electrified pumping reduced lifting costs by *36 percent!* In another, it produced savings that completely offset power costs. In every case the savings have been substantial . . . a natural result of these cost-slashing advantages of electrification. *How much will they save for you?*

Lower maintenance costs—Fewer wearing parts mean less inspection . . . less servicing.

Less manpower required—Sure time-clock operation permits maintenance of efficient, intermittent pumping schedule without human attention.

All-weather operation—Sure starting and high efficiency regardless of the weather or age of the equipment: Trouble-free operation at low temperatures; no "freeze-ups" to cause downtime . . . lost production.

Lower installation costs—Only a minimum foundation required; no house needed for weatherproof motor and controls.

Why not analyze your operation in the light of these profit-building possibilities? Westinghouse Petroleum Industry Specialists—representing a single source of supply for every electric pumping need—are prepared to help. Their wide experience in helping others to gain the benefits of electrification assures you of getting the most from your investment.

For know-how . . . for dependable equipment . . . for undivided responsibility . . . come to Westinghouse and be *sure!* Call your nearest Westinghouse office or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-94854

Westinghouse

EQUIPMENT FOR THE PETROLEUM INDUSTRY

For worms and gears—in standard sets or to special requirements—or as worm-gear speed reducers, including the economical fan-cooled Speedaire unit—you can always depend on Cleveland.

High quality worms and gears to meet your needs

● You pay no more for Cleveland worms and gears—and yet, built into them are extra years of service and satisfaction.

Uniform, high quality has been an outstanding characteristic of Clevelands through 38 years—a generation devoted to the manufacture of fine worms and gears exclusively. Specifically, there are four ingredients of Cleveland quality:

1. Correctness of design—design proved best by years of performance.
2. The finest of materials, selected after years of experience and research.
3. Modern machine tool equipment, in a modern plant kept up-to-date by a policy of continuous replacement.
4. Machinists and other production workers who are craftsmen, trained in precision work.

So whatever your need, consult Cleveland. Sales representatives in all major industrial centers are at your service, to help you select correct types and sizes and discuss any phase of your power transmission problems.

Write for the latest Cleveland catalog, indicating your requirements. The Cleveland Worm & Gear Company, 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

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IN FLOW CONTROL EQUIPMENT,

the BEST *is not too good for you*

Why not take advantage of Powell "know-how" in design, workmanship, and *use of materials?*

The Complete Line includes valves in Bronze, Iron, Steel and the widest selection of Corrosion-Resisting metals and alloys ever made available to Industry.

Quality fine throughout "The Line"

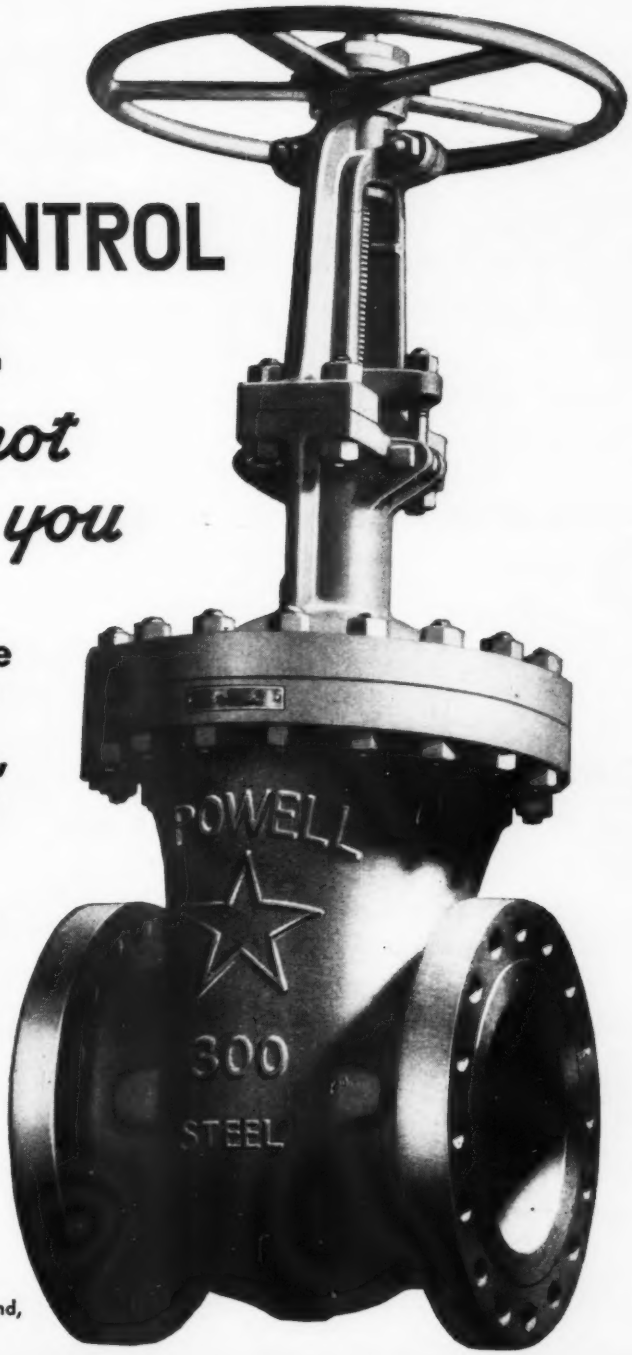

Fig. 3003—Class 300-pound, flanged end, Cast Steel O. S. & Y. Gate Valve.

POWELL

The WM. POWELL CO., 2525 Spring Grove Ave., P. O. Box 106, Station B, Cincinnati 22, Ohio

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12 GOOD REASONS WHY

LANE-WELLS BULLET PERFORATING

GIVES OPERATORS BETTER RESULTS

1 PENETRATION

Proved by Lane-Wells high percentage of successful jobs.

2 MEASUREMENT ACCURACY

Precision instruments have made Lane-Wells depth measurements the standard of the industry.

3 SELECTIVE FIRING

which provides any desired shot density from 1 hole in 100 feet to 100 holes in 1 foot.

4 GUNS

from 1 shot to 128 shot, in types and sizes to fit every perforating job.

5 BULLETS

in 6 different types for different jobs, in 6 sizes to suit varying needs.

6 SAFETY

— A 5-point firing system and other safety engineered features, insure safety to property and personnel.

7 TRAINED CREWS

. . . thoroughly experienced men, who do a good job in minimum time.

8 FIELD MEN

who know their business . . . and your conditions . . . provide valuable valuable aid if needed.

9 56 BRANCHES

to give quick service to any oil field, at any hour . . . day or night.

10 MODERN EQUIPMENT

Up-to-the-minute equipment, top quality in even the smallest details.

11 EXPERIENCE

gained in 145,000 jobs in nearly every oil-field in the country.

12 ENGINEERING RESEARCH

which works steadily for continued improvement in equipment and methods.

Your LANE-WELLS MAN can give you complete details!

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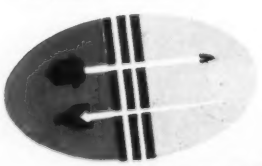

PERFORATING

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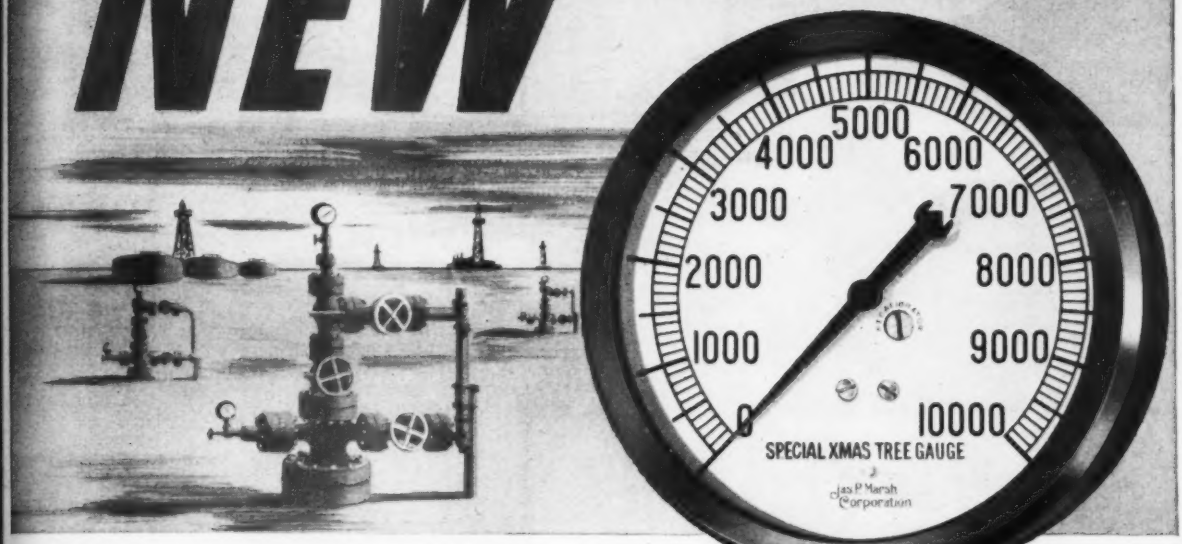
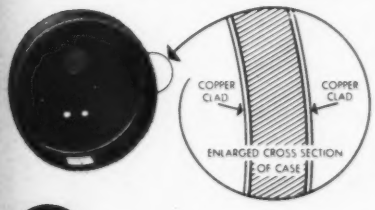
General Offices, Export Office and Plant • 5610 So. Soto St. Los Angeles 58, California

Los Angeles • Houston • Oklahoma
Lane-Wells Canadian Co. in
Petro-Tech Service Co. in

A NEW Xmas Tree Gauge

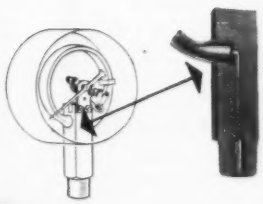


TAKE A GOOD LOOK at the facts presented below and we believe you'll agree that this is the finest Xmas Tree Gauge ever developed!



1 NEW *Marshalloy* CASE

A brand new conception in gauge housings. It is corrosion resistant, four times as strong and one-third lighter than conventional iron cases. It is made of copper-clad wrought steel of boiler plate thickness. It is much less likely to corrode than iron or steel, but has the strength of heavy-gauge steel. Known as "Marshalloy," it has all the advantages of plastic or die-cast cases, but none of the disadvantages. It can't be broken like a plastic or die-cast case. It won't rust or corrode. It has four times the strength of cast iron, but only two-thirds the weight. Finished in a new corrosion resistant, satin black enamel, and fitted with Marsh safety blow-out plug, it is the finest case you have ever seen.

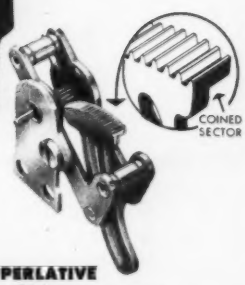


2 NEW *Conoweld* TUBE

Tube, socket and end-piece "Conowelded" into an integral unit

To insure absolute dependability, a gauge must be made permanently leak-tight from inlet to end-piece of the bourdon tube. This has always presented a tough problem, but here is the final solution. By a special process the tube is "Conowelded" into socket and end-piece to form the equivalent of one-piece construction. The tube is then accurately tempered to required resiliency.

The unretouched photo of a socket sawed in half shows the perfect fusion of the joint at the point where the bourdon tube enters the socket—the joint that is most difficult to make. Photomicrographs are also available to prove the perfection of this process.



3 SUPERLATIVE *Mastergauge* MOVEMENT with coined sector

The crowning touch to the Xmas Tree Gauge is the Marsh "Mastergauge" Movement. In tens of thousands of Marsh "Mastergauges" this finer movement has proven its ability to stand the gaff of oil country service better than any other.

Notice the broad pinion gear and coined sector gear surfaces with teeth cut to the highest standards of precision. The coined form (see enlarged section) is a typical Marsh refinement — a form that gives greater strength where greatest strength is needed. Unlike metals, giving a self-lubricating frictionless effect, are used throughout. It is a movement in keeping with the advanced design and construction of this new Gauge.

MARSH INSTRUMENT CO. Sales affiliate of Jas. P. Marsh Corp. **Dept. L, Skokie, Ill.**

Houston Branch Plant **1121 Rothwell St., Houston, Texas**

MARSH GAUGES

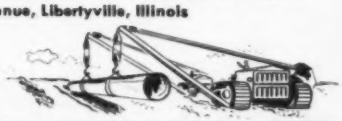
Noise Control

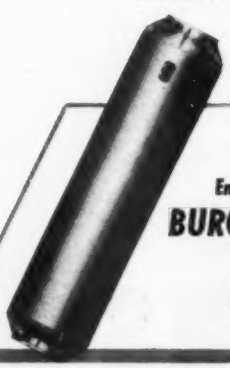
along thousands of miles of Pipe Lines . . . with Burgess-Manning Snubbers

● Across flat prairies, farm land, over hills, across valleys, under surging rivers . . . wherever the ditcher blazed the trail and the welder sweated making "stringer beads," you find pipe lines carrying crude oil or gas. At numerous pipe-line stations along the route, Burgess-Manning Snubbers are quieting the explosive exhaust from noisy internal combustion engines. These Snubbers convert the high-energy slugs of exhaust gases to a continuous flow . . . dissipating their energy to reduce the roar to the noise-level of the surrounding area. Consult the Burgess-Manning engineers, today.

BURGESS-MANNING COMPANY

749 East Park Avenue, Libertyville, Illinois





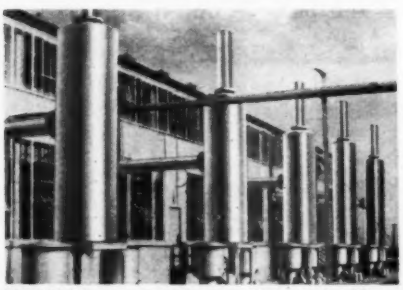
For Prompt Service
Contact Our New
Engineering and Sales Office

BURGESS-MANNING CO.

1203 Dragon Street

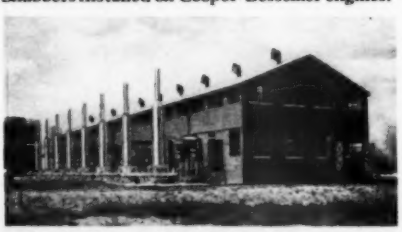
DALLAS, TEXAS

LOUISIANA: Burgess-Manning Exhaust Snubbers installed on gas engine compressors.



KANSAS: Burgess-Manning STL-14 Snubbers on 800-hp engine compressors.

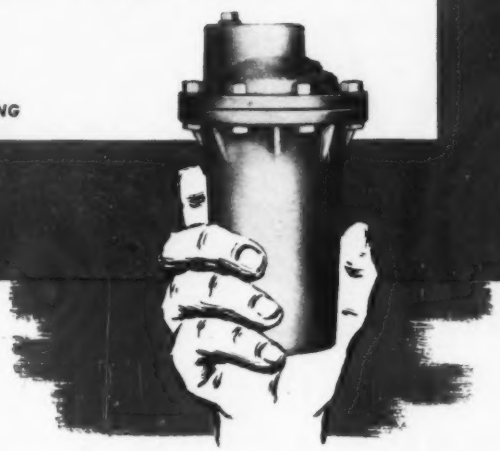
LOUISIANA: Burgess-Manning Exhaust Snubbers installed on Cooper-Bessemer engines.

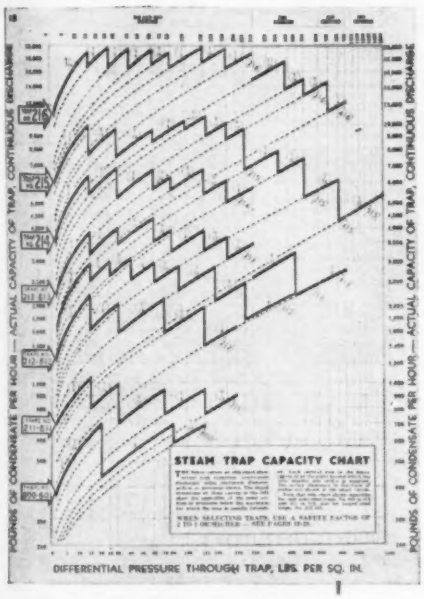


TEXAS: Burgess-Manning Snubbers on eight 1100-hp gas engines.

Only actual hot condensate capacities give a true picture of steam trap value

YOU KNOW THE CAPACITY WHEN YOU BUY AN ARMSTRONG




STEAM TRAP CAPACITY CHART
POUNDS OF CONDENSATE PER HOUR — ACTUAL CAPACITY OF TRAP, CONTINUOUS DISCHARGE
DIFFERENTIAL PRESSURE THROUGH TRAP, LBS. PER SQ. IN.

THEORETICAL calculations fail entirely to give a true picture of trap capacity. Orifice tests fail to account for capacity losses caused by pipe friction. Tests with cold or warm water do not take into consideration the capacity-reducing effect of flash steam. Only tests with actual trap hookups handling hot condensate will tell you the true continuous discharge capacity of a steam trap—and those are the capacities Armstrong gives you.

If capacities are misleading you may buy a trap too small for the job. Or, if you compare different makes of traps on a price basis you must know if they are comparable on a capacity basis or the comparison means nothing.

Dollar for dollar and size for size Armstrong steam traps give you greater capacity—another reason why they are your wisest buy. Your nearby Armstrong Representative can supply you. Call him for recommendations.

IT PAYS TO KNOW BEFORE YOU BUY!

THE ARMSTRONG STEAM TRAP CAPACITY CHART is based on hundreds of tests with hot condensate. You can depend on its accuracy.

ARMSTRONG MACHINE WORKS
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The 36-PAGE STEAM TRAP BOOK gives Armstrong trap capacities and tells how to select the right size trap for every job. Ask for a copy.

SEE OUR CATALOG IN SWEETS OR CEC

ARMSTRONG STEAM TRAPS

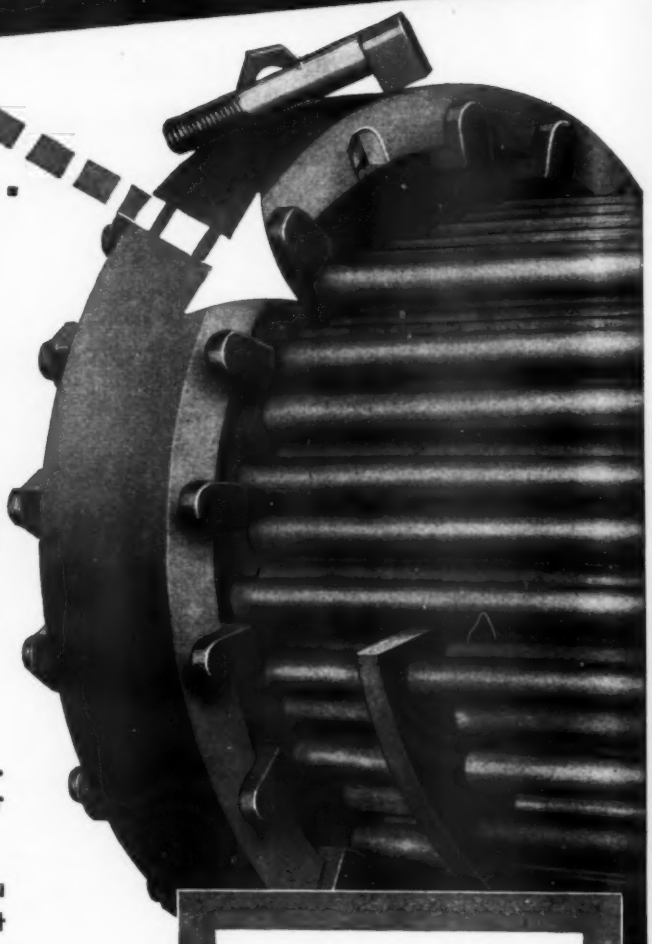
NO LEAKS HERE

with the patented . . .

Vogt

ELL BOLT CONSTRUCTION

of Floating
Tube Sheet Assembly



YOU LOSE when an exchanger leaks . . . with the possibility of fluid contamination, or frequent shutdowns for repairs.

None of these evils need plague you when you employ the Vogt patented floating tube sheet assembly because there is no distortion of a split ring to worry about in making up the joint time after time. It's easy to make tight and it stays tight!

Bulletin HE-6 is a pictorial presentation of standard and special types of Vogt Heat Exchangers. Write for a copy on your letterhead.

Patent Nos.
1,895,735
2,232,478

HENRY VOGT MACHINE CO. INC. • LOUISVILLE 10, KY.

Branch Offices. New York, Philadelphia, Cleveland, Chicago, St Louis, Dallas

Vogt HEAT TRANSFER EQUIPMENT

Shafts take a turn for the better on pillow blocks with TIMKEN® bearings

WITH shafts turning on Timken® bearings, you're assured of long, trouble-free service, virtually friction-free operation, and minimum maintenance, even under the heaviest loads.

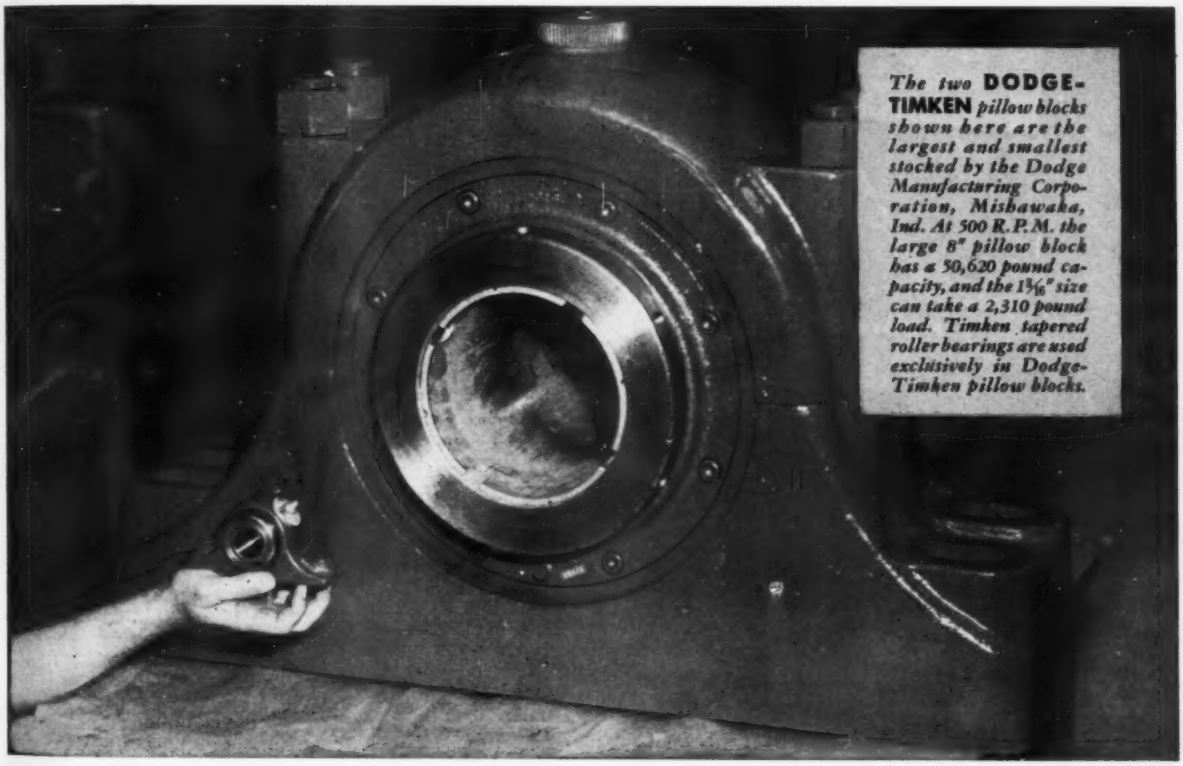
Line contact between rollers and races gives Timken bearings extra load-carrying capacity. True rolling motion and incredibly smooth surface finish make friction practically negligible. Shaft wear is eliminated. And because of tapered construction, Timken bearings can take radial and thrust loads in any combination.

Tighter closures are permitted that keep lubricant in—dirt and moisture out. Lubrication and maintenance costs are reduced.

Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—and under normal conditions will last the life of the equipment with which the pillow blocks are used.

Backed by half a century of bearing research and development, Timken bearings are first choice throughout industry. If you need pillow blocks, specify those equipped with Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



The two **DODGE-TIMKEN** *pillow blocks shown here are the largest and smallest stocked by the Dodge Manufacturing Corporation, Mishawaka, Ind. At 500 R.P.M. the large 8" pillow block has a 50,620 pound capacity, and the 1 3/16" size can take a 2,310 pound load. Timken tapered roller bearings are used exclusively in Dodge-Timken pillow blocks.*

WE MAKE OUR OWN STEEL

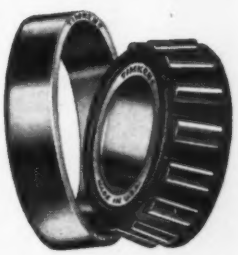
The special grade alloy steel which gives Timken bearings their strength and resistance to wear, is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

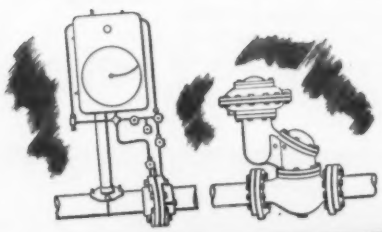
TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST ⊣◎⊢ LOADS OR ANY COMBINATION ✳

SOME EASTERN SEABOARD REGIONS NOW RECEIVING NATURAL GAS THROUGH AMERICAN METER COMPANY EQUIPMENT



GREATER NEW YORK
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In the great new pipelines serving metropolitan Eastern United States, American Meter Company precision equipment plays a vital part. American instrumentation assures complete operating control, accurate records for better planning, reduction of operating costs and satisfied customers.

AMERICAN METER COMPANY

INCORPORATED (ESTABLISHED 1836)

GENERAL OFFICES—60 EAST 42nd STREET
NEW YORK 17, N. Y.

EQUIPMENT IN SERVICE

1. CBV Regulators, Pilot Spring or Weight Loaded
2. CBV Regulators, Pilot Remote Controlled
3. Orifice Meters Recording
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5. Orifice Meters Telemetering
6. Orifice Meters Integrating Remote Counter
7. Meter Runs
8. Orifice Fittings
9. Differential Valves
10. Controllers, Pressure
11. Controllers, Flow
12. Temperature and Pressure Recorders

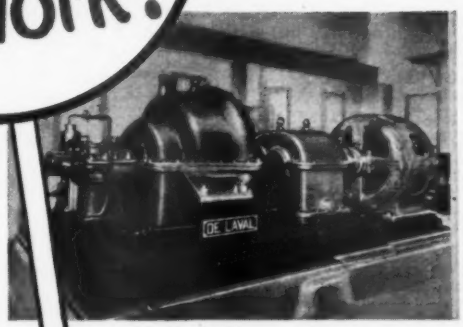
XUM

De Laval Blowers at work!

Birds-eye View of 343,000 C.F.M.

That's the combined capacity of these three big De Laval blast furnace blowers installed at the Edgar Thomson Works of Carnegie-Illinois Steel Corporation. Every day they handle enough air to fill a four foot square tunnel from Manila to Madrid and back to Miami. What's more, blast furnaces aren't shut down till they need relining and it takes husky, heavy duty machines like these to stand up for long periods of continuous operation.

For your next blower, be sure to get more than just a birdseye view of a De Laval unit. Let our engineers show you the whole picture.



They forgot the rule book for this blower!

We would never recommend that a centrifugal blower be opened for inspection only once every 22 years. Yet this De Laval two-stage machine in the Houston, Texas Sewage Disposal Plant was recently opened for the first time since it was installed in 1928 . . . *the blower and gear were in near perfect condition!* Our service man only had to clean up the journals a bit and put the unit back in service. If heavy-duty, continuous service is important, take your cue from this. We build 'em to last.

Stopping vibration before it starts!

If a cat's whisker could hang onto the edge of one of these spinning blower wheels, the unbalance it created would show up on the dials of this dynamic balancer. Any unbalance, no matter how slight, can be detected and corrected right here. This is just one of the ways we build extra years of service into a De Laval blower.

DE LAVAL STEAM TURBINE CO., TRENTON 2, N. J.

TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

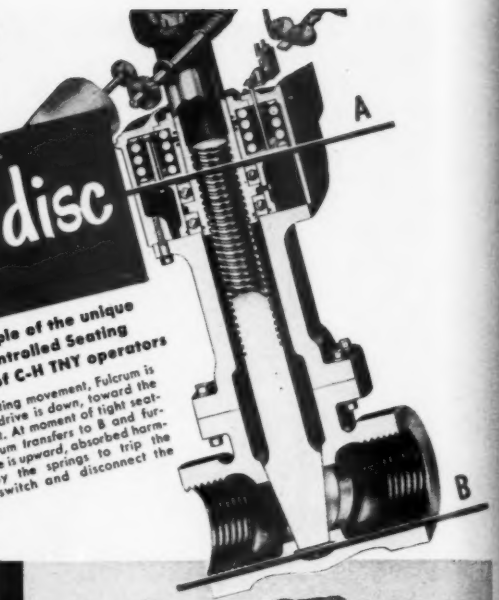
50th DE LAVAL Anniversary

C-17

The Amazing Story of C-H TNY Valve Operators

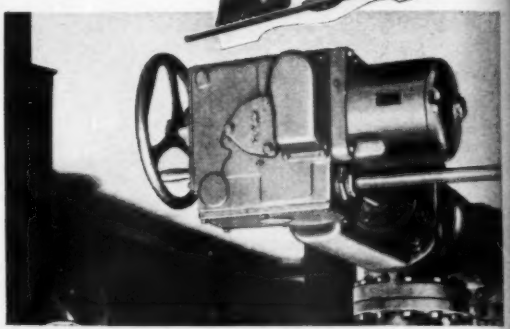
Positive seating of valve disc

...but without damage to valve parts



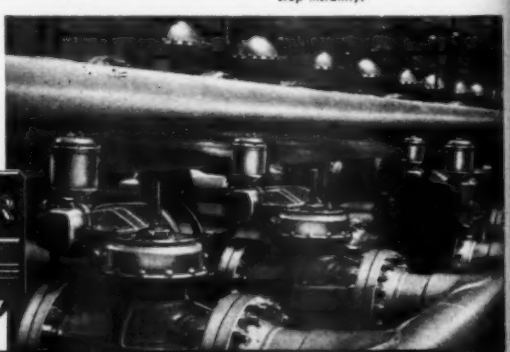
The principle of the unique Thrust Controlled Seating feature of C-H TNY operators

During seating movement, Fulcrum is at A and drive is down, toward the valve seat. At moment of tight seating, Fulcrum transfers to B and further drive is upward, absorbed harmlessly by the springs to trip the Thrust switch and disconnect the motor.



(Above) Experience behind C-H Type TNY operators dates back to 1900, embraces every type of valve application.

(Below) For valves which do not seat such as plug type valves, C-H B2 automatic declutching valve operators act swiftly and stop instantly.



Cutler-Hammer Motorized Valve Operators not only provide the automatic, immediate and swift operation of valves but they also assure *accurate* seating, *safely*.

Due to the exclusive *Thrust Control* principle employed, these operators provide the following important advantages:

They *always* assure a tightly seated valve regardless of the frictional condition of the valve stem or the driving mechanism.

They *definitely* prevent damage to a valve from the expansion and contraction of valve parts under extremes of temperature.

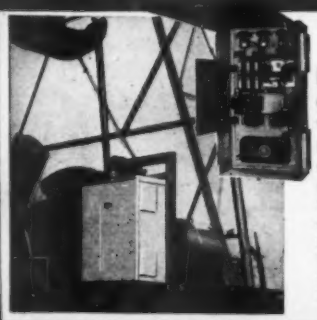
They *unfailingly* provide accurate seating no matter how swiftly the valve is closed and they prevent damage in case foreign matter lodges in the valve.

Cutler-Hammer *controlled thrust* Valve Operators gain their superiority through what may be called a transferable fulcrum. They drive through a yoke nut fulcrum established by heavy steel springs whose compression is equal to the desired tight seating pressure. When the valve is accurately seated, the *seat* becomes the fulcrum, the yoke nut retracts, opening the motor circuit, and motor drift is absorbed by the springs. Moreover, the same accurate seating is maintained as valve parts expand and contract.

Now is the time to investigate this proven superior motorized valve operator for your needs. Available as standard equipment on all leading makes of valves . . . CUTLER-HAMMER, Inc., 1453 St. Paul Avenue, Milwaukee 1, Wisconsin.

CUTLER-HAMMER
VALVE CONTROL
C-H

Other Cutler-Hammer Products for the Oil and Gas Industry



Long-lasting control that "schedules" oil well pumping

This Cutler-Hammer Motor Control Device built to the rigid requirements of tough oil country service automatically starts pump going and shuts it down in synchronization with oil well capacity or in conformity to operating schedule. You can set up any sequence of day and night operation, set it to skip certain days. Bulletin 9589D-21 tells all about this amazing pumping control. Send for free copy.

Know what you are buying, selling, giving away *These "gas counting" instruments tell you accurately*

Cutler-Hammer Calorimeters . . . standard wherever gas is bought or sold—actually count the B.t.u.'s per cubic foot of the gas you are sending or receiving. Accurate within 1%. They also write a continuous 24-hour a day permanent record so you know at all times exactly what is going through your piping system . . . for accurate accounting and billing, and for accurate control of gas heating value. Free booklet "Where Experience Counts" tells all about C-H B.t.u. Control.

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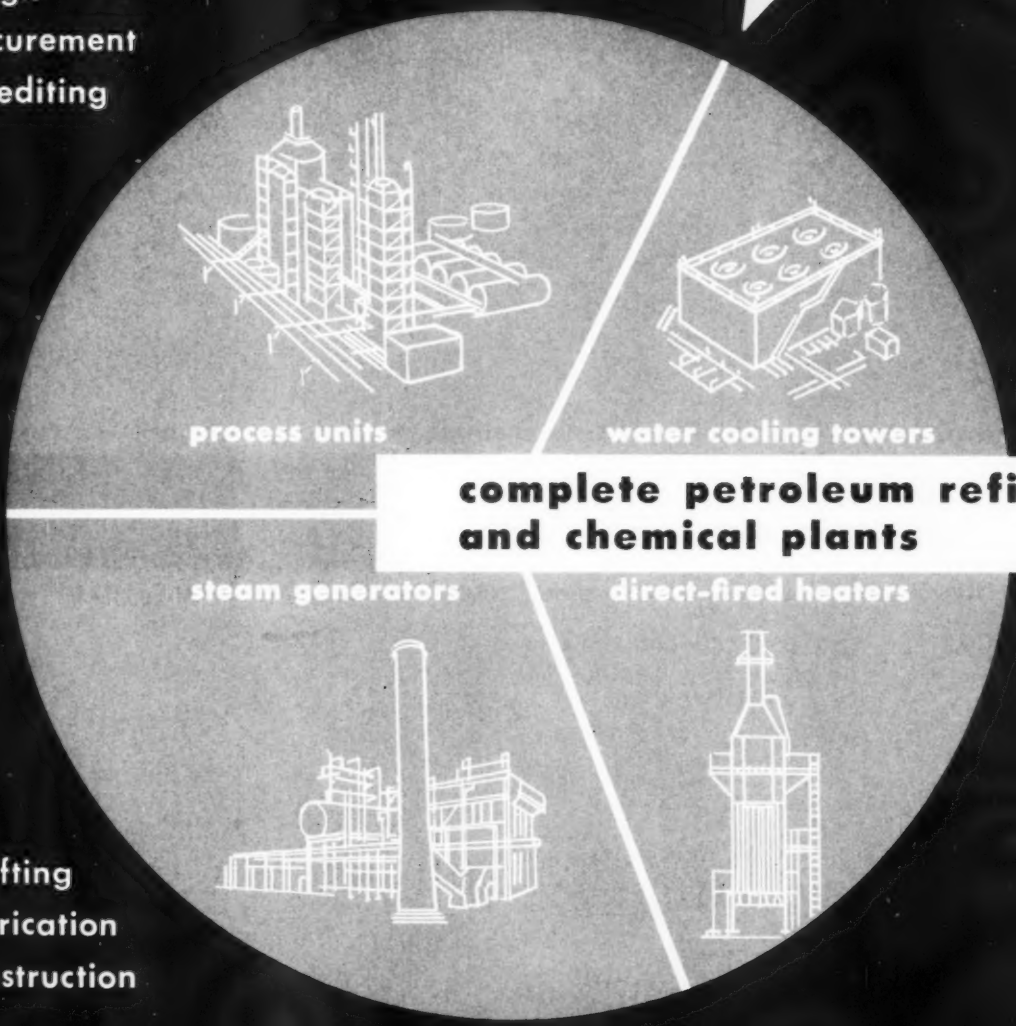
all or part

design
procurement
expediting



complete petroleum refineries and chemical plants

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Over 50 years experience in providing complete engineering and construction service to all industry — anywhere in the world.

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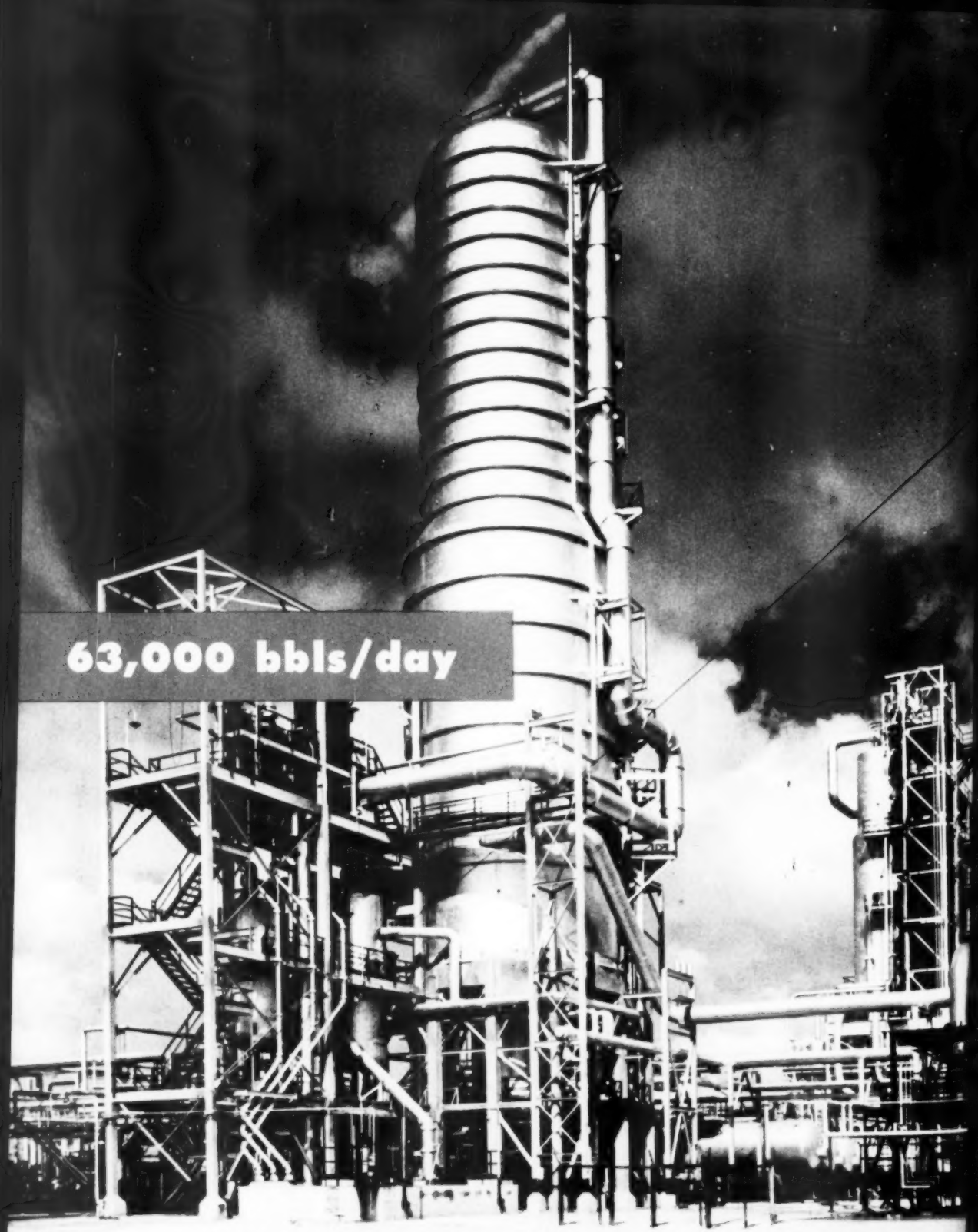

One of the largest 2-stage Crude Distillation units in the world. Designed and constructed by Foster Wheeler, this unit was recently placed in operation at the Amuay Bay, Venezuela refinery of the Creole Petroleum Corporation.

FOSTER WHEELER CORPORATION

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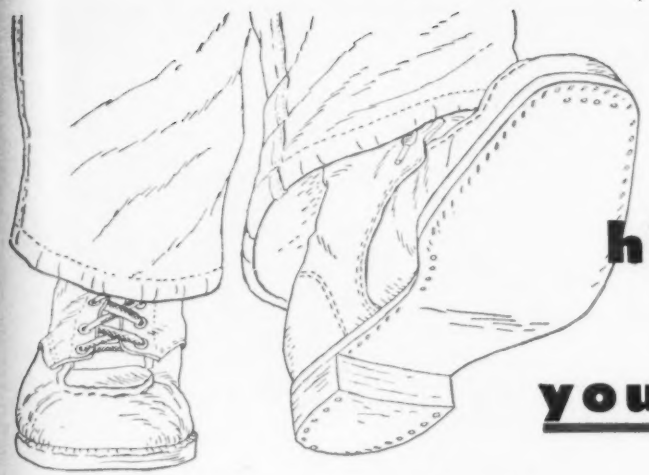


his footwork solves your guesswork!

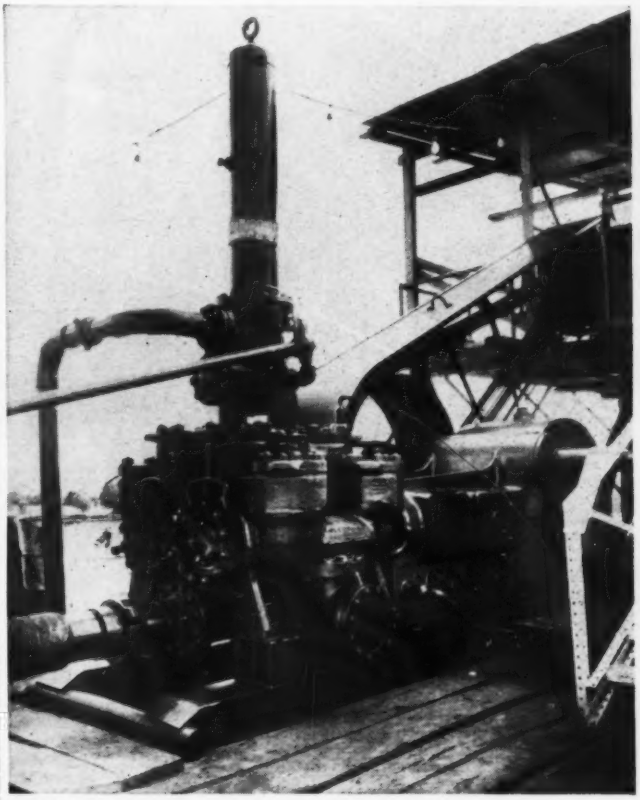
Footwork is second nature with a Gardner-Denver field engineer. He often tramps around the oil fields, learning first hand just what your most troublesome drilling problems are — just what you expect a slush pump to do.

That's one reason Gardner-Denver Slush Pumps meet your needs so well. You don't have to guess about their performance on your rig.

Check these field-proved FX features:

- Divided liquid cylinders of GarDurloy—the extra tough alloy specially developed for mud pump service.
- "Slush-proof" liquid end parts—easily changed in the field without opening the crankcase to dust and dirt.
- Rigid, one-piece main frame assures accurate alignment—extra strength and safety.
- Positive, mud-stop protection prevents contamination of crankcase oil.
- Plus: eccentric construction—herring-bone gears—flood lubrication—and many other quality features.

Ask your Gardner-Denver field engineer for expert advice on mud pump selection. Or write us for further information.



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Gardner-Denver Company, Quincy, Illinois
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THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

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gives full volume
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a.C.f. Cylindrical Plug Valves cut the man-waiting time of flow control in batch measuring. And on high volume flow, the exclusive straight-through, full pipe opening saves power. Any valve less efficient is more costly in the long run.
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CYLINDRICAL
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Write for catalog 4-OG, showing types and sizes. American Car and Foundry Company, Valve Division, 1501 East Ferry Ave., Detroit 11, Mich.

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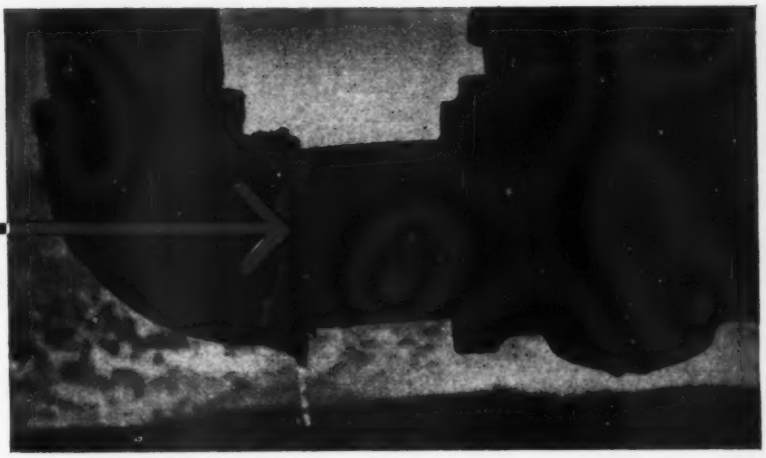

GET THIS

WITH COATINGS BASED ON VINYLITE BRAND RESINS!

These two plug valves and connections in Texas oil field flow lines are proof of the effectiveness of the protective coatings based on VINYLITE Brand Resins!

Both assemblies were installed to carry salt water and basic sediment from storage tanks. The uncoated metal sprang leaks in two months. The coated metal shows no appreciable corrosion after more than two years!

On oil well equipment asea and ashore, as in refineries, chemical plants, acid plants, sewage disposal plants, breweries—coatings based on VINYLITE Resins are paring maintenance costs, reducing shut-downs, and protecting equipment, for more and more operators. These coatings are easily applied. Durable and impact resistant, they strongly resist water, weather, and sunlight, in addition to oils, greases, alkalies, and most strong acids and other chemicals.

On metal or concrete, they keep containers from damaging contents, and contents from injuring containers. They are odorless and tasteless. Available in a wide range of colors, they have excellent integrity and bond.

For more information on coatings based on VINYLITE Brand Resins, and a list of representative suppliers, write Dept. KF-68.

"Coro-Gard" coating (lower photograph) by Minnesota Mining and Manufacturing Co., 411 Piquette Avenue, Detroit 2, Mich., applied by A. J. Hunt Contracting Co., Odessa, Texas.

Vinylite BRAND RESINS

TRADE MARK

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A Division of
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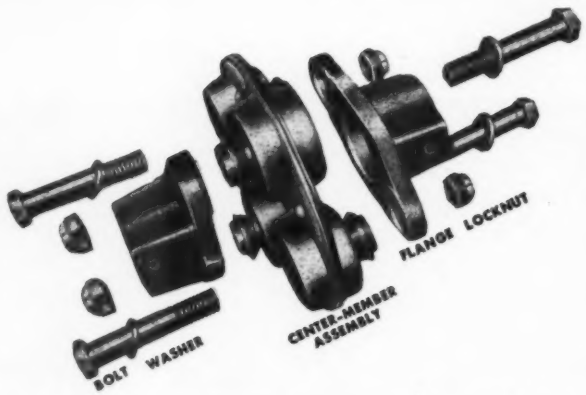
MORSE MORFLEX COUPLINGS

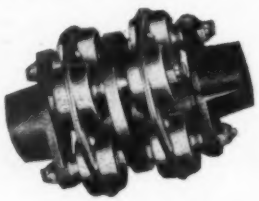
ABSORB TORSIONAL VIBRATION



Exploded view of **Single Morflex Coupling,** which takes torsional load wrap-up, absorbs shock, vibration, load pulsations. It compensates for misalignment.

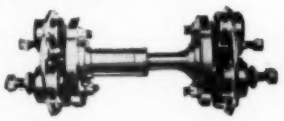
Morse Morflex Couplings withstand the severe operating conditions found in the petroleum industry. These unique couplings are built around special resilient Neoprene biscuits which provide live, muscle-like flexing action. Relative movement between shafts is confined to the controlled displacement of the rubber biscuits.

Morse Morflex Couplings (and their related drive shafts) transmit power smoothly and efficiently, cut maintenance costs as well. They are torsionally flexible, isolate vibration, absorb shock loads, compensate for misalignment. They permit free end float without undue thrust loads on drive shaft bearings. And since there is no metal-to-metal contact, lubrication is not required.



Double Morflex Coupling has twice the torsional flexibility of the single type. For extreme misalignment.

Series T Drive Shaft is solid or tubular depending on capacity. Inter-flange distance from 3⅛" to 84". HP capacity from .25 to 13.80 per 100 RPM.



Series S Drive Shaft: Grease-tight slip joint permits end float. Inter-flange distance from 10-5/16" to 17⅛". HP capacity from 1.60 to 13.80 per 100 RPM.
Series ST Drive Shaft: Basically a Series S but with inter-flange distances of from 11-3/16" to 84". HP capacity same as Series S.
(Not illustrated.)

Ask the Morse Man for power transmission information!

100 Morse Branch Offices and Distributors to supply your power transmission demands.

From coast to coast there are more than 100 offices, representatives and distributors of Morse Power Transmission products to give you quick information and service when you want it—where you want it. *Ask the Morse Man first in any case!* Check your classified phone directory under **"Power Transmission"** or **"Chains"** for the nearest Morse Man.

Morse *means* Power Transmission

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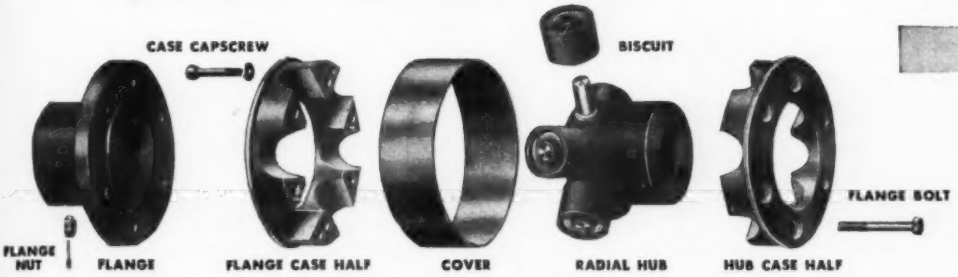
REFINING, PUMPING!

and MORSE RADIAL COUPLINGS

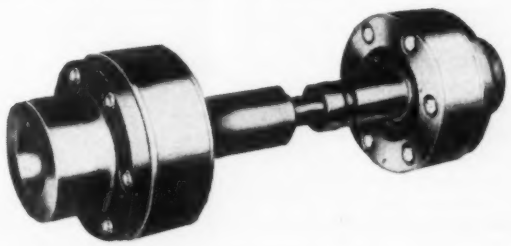
AND THRUST LOADS, TOO



The Morse Radial Coupling uses the same Neoprene biscuits as the Morflex, but in this coupling, the biscuits are assembled radially on the equally spaced steel pins of the hub member.

Despite its rugged construction, the Morse Radial Coupling's torsional flexibility is so great in proportion to capacity that it is exceptionally suitable for drives subject to heavy torque loads, shock, or high-frequency load reversals.

The Morse Radial Coupling provides high torque capacity and torsional flexibility on horizontal or vertical axes. IT IS SPECIALLY RECOMMENDED FOR VERTICAL INSTALLATIONS WHERE THRUST IS A PROBLEM. (Like the Morflex, the Morse Radial needs no lubrication. Abrasive dirt, oil, chemicals, water, and bad weather have no effect on it.)



Series RS (Radial Coupling Drive Shaft): Provides end float plus added capacity. Inter-flange distance from 10⅝" to 14⅝". HP capacity: 3 to 40½ per 100 RPM. *(Not illustrated.)*

Series RT Drive Shaft: Basically a Series RS but with inter-flange distances of from 11⅛" to 84". HP capacity same as Series RS.

Write us today for more complete information. Ask for Catalog C 41-48.

MORSE CHAIN COMPANY
Dept. 143, 7601 Central Ave.
Detroit 8, Michigan

MORSE
MECHANICAL
POWER TRANSMISSION
PRODUCTS

PRODUCTS OF BW BORG-WARNER

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Bingham

PRECISION BUILT FIELD PROVEN PUMPS

"Double Volute" MULTI-STAGE Pumps

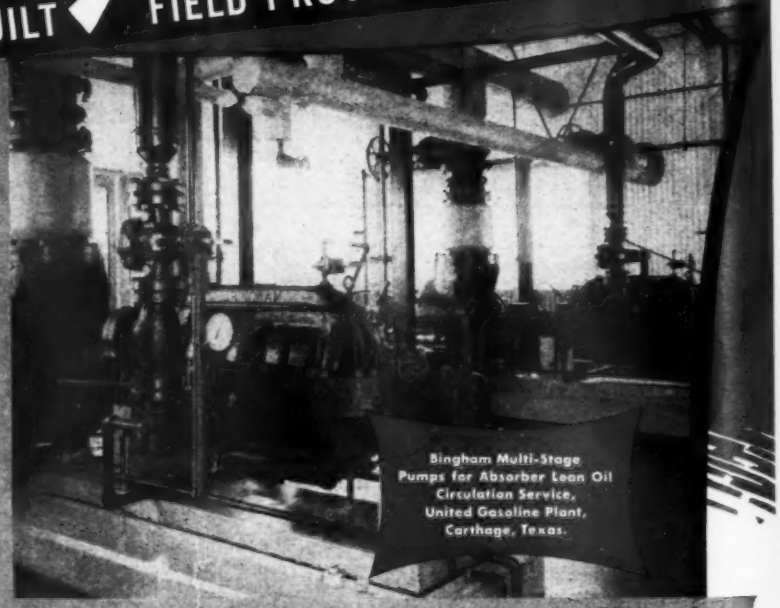
All Bingham Multi-Stage Pumps are of "Double Volute" design, insuring perfect radial balance —unusually short span between bearings—case bolts uniformly located close to shaft centerline —integral crossovers producing casings of maximum strength for high pressure service.

Bingham "Double Volute" Multi-Stage Pumps have been field proven for such high pressure service as *Cold Charge Pumps, Boiler Feeders, Pipe Line Booster Stations, Absorber Lean Oil Circulation,* and other applications requiring the utmost in sustained efficiency and low maintenance.

• • •

It takes Big Precision Tools like these to Build Pumps like this

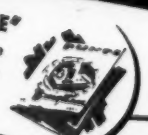
Bingham High Pressure Multi-Stage Pumps, like all Bingham products, are precision built. All parts requiring close tolerances are ground on heavy duty precision grinders. Pump case flanges of Multi-Stage Pumps are finished ground to a perfect degree of flatness by heavy duty grinders which are typical of the precision machinery in our new, modern plant.



Bingham Multi-Stage Pumps for Absorber Lean Oil Circulation Service, United Gasoline Plant, Carthage, Texas.

Heavy Duty Face Grinder in our new and modern plant.

SEND NOW FOR "DOUBLE VOLUTE" treatise describing the principle and advantages of Bingham "Double Volute" pumps.



Bingham PUMPS SINCE 1921

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R-S valvEvents

• EXCERPTS FROM THE R-S BOOK OF EXPERIENCE •

RUGGED Simplicity

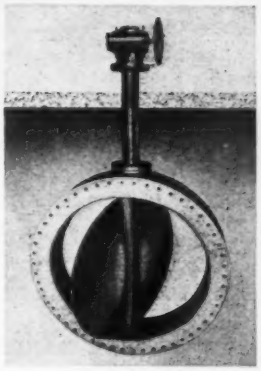
Correctly engineered mechanically and metallurgically, all body assemblies of R-S Valves equal or exceed A. S. A. standards in every detail. These valves are designed and constructed for rugged service and provided with such safety factors that they will exceed service expectations as well as reduce pumping and blower costs.

Consider also the few working parts, greater control rangeability, the self-cleaning feature and the fact that R-S Valves are readily adapted to automatic operation. Know the rugged simplicity of R-S Valves, and get the most from your valve investment.

District offices are listed in telephone directories as, "R-S Products Corp'n Valves".

R-S PRODUCTS CORPORATION
4600 Germantown Avenue, Philadelphia 44, Pa.
An S. Morgan Smith Company Subsidiary

No. 782—Heavy Duty Rubber Seated Wafer Type Valve with 5° angle seated vane and enclosed gear reduction drive. Gland can be removed and stuffing box repacked without removing prime mover.



No. 739-740—Sixty-inch, 50-pound Heavy Duty Valve with gear reduction drive and handwheel for handling water at 40 psig. Vertical valve stem enclosed in steel pipe support. Thrust bearing absorbs vertical load.

No. 730—R-S Heavy Duty Floor Stand for rugged service in connection with any standard R-S handwheel operated valve.

No. 767—A 3-Way Valve (Two 24-inch 125-pound Cast Iron Valves bolted to 125-pound American Standard Tee). Electric motor operated by cross linkage. Automatic declutching handwheel for emergency operation.

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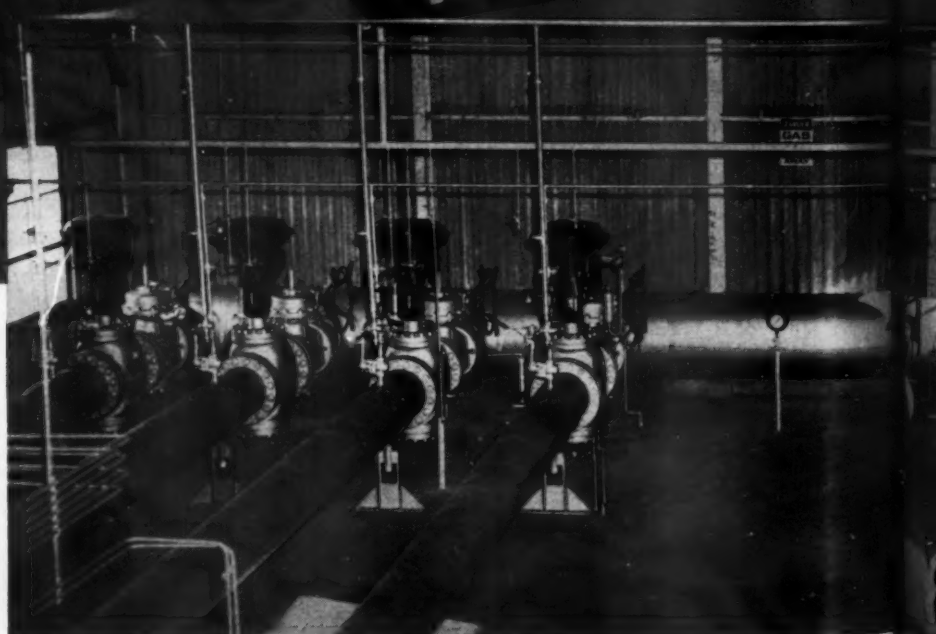
Masoneilan



Illustrated are Masoneilan 10" Control Valves, Pressure Controllers and Positioners controlling pressure to low pressure header at Manhattan Regulator Station on the east bank of the Hudson River, adjacent to George Washington Bridge.

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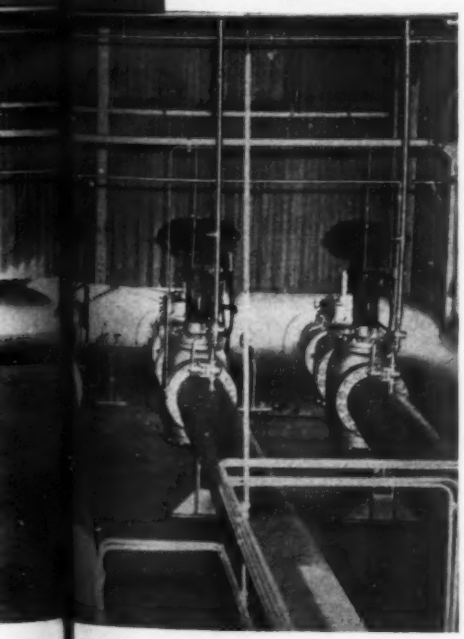
Control Valves

at Manhattan Terminal of Transcontinental Pipe Line

Deliver New York City's First Natural Gas

After flowing three to four days through over 1800 miles of 30-inch pipe, 250 million cubic feet per day of Texas-Louisiana natural gas is delivered to the eastern seaboard for distribution in New York City . . . the longest pipe line in the world is in operation.

Masoneilan 10-inch Series 10,000 Control Valves, operated by Masoneilan Model 2707 Pressure Controllers and Masoneilan Series 7400 Positioners, control the gas pressure at the Manhattan and Linden, N. J. terminal stations. A portion of the gas controlled by these Masoneilan Valves at the Linden terminal is destined for eventual distribution to New England.



The preference for Masoneilan Control Valves among pipe line builders and operators is recognition of quality which has been endorsed by the selection of Masoneilan Valves for the major pipe lines of the world.

If your responsibilities include control valve selection for *any* industrial use, compare Masoneilan Valves with any others.

Quality Characteristics Make Masoneilan Control Valves Outstanding

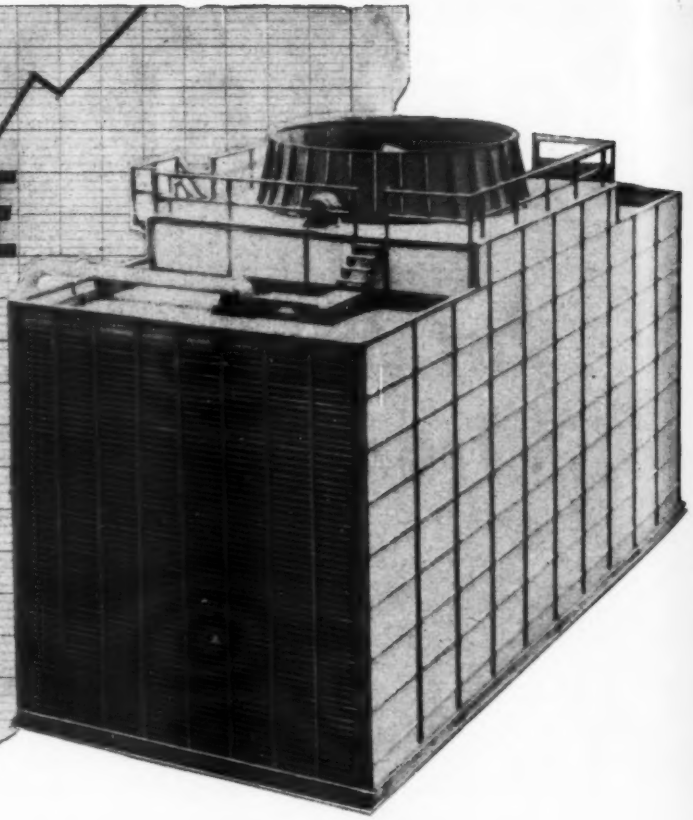
MASON-NEILAN REGULATOR CO.

1185 ADAMS STREET, BOSTON 24, MASS., U.S.A.

MASONEILAN

Sales Offices or Distributors in the Following Cities: New York • Syracuse • Chicago St. Louis • Philadelphia • Houston • Denver • Pittsburgh • Cleveland • Cincinnati Tulsa • Atlanta • Los Angeles • San Francisco • Salt Lake City • El Paso Boise • Albuquerque • Detroit • Charlotte, N.C. Mason-Neilan Regulator Co., Ltd., Montreal and Toronto

PEAK PERFORMANCE DEMANDS MARLEY DOUBLE-FLOW



As the production curve ascends, Marley DOUBLE-FLOW owners increasingly will know the double satisfaction of a good investment and a problem solved.

Marley patented DOUBLE-FLOW design long has been accepted as the standard for functional efficiency. *Now* the exclusive DOUBLE-FLOW features that make for every-minute operation are of utmost importance.

Only DOUBLE-FLOW OPEN DISTRIBUTION permits cleaning in minutes instead of hours and without complete shutdown. Only DOUBLE-FLOW design reveals tower operating condition at a glance. And Marley MECHANICAL EQUIPMENT, engineered for cooling tower service exclusively, is a final assurance of uninterrupted service.

DOUBLE-FLOW has a definite place in your production picture . . . let your nearest Marley Application Engineer explain it without obligation or write for Bulletin DF-50.

Also Producers of

AQUATOWERS
DRICOOLERS
VAIRFLO TOWERS
NATURAL DRAFT TOWERS
SPRAY NOZZLES

The Marley Company, Inc.

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superior Dow distribution

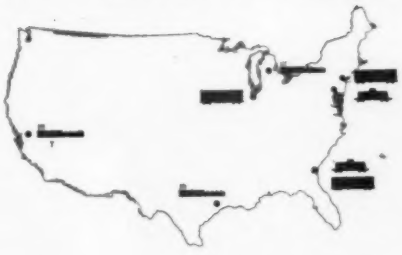
Depend on Dow distribution to keep your production steady and profitable.

Dow maintains Caustic Soda Solution bulk tank distributing terminals in Carteret, New Jersey and Charleston, South Carolina. Caustic Soda Solid, Flake and Ground Flake are shipped from terminals in Chicago, Illinois, Port Newark, New Jersey, and Charleston. Caustic Soda production is funneled into these terminals from three large plants—in Michigan, Texas and California. By tank and box car, truck and ship, Dow caustic soda reaches your plant on schedule.

These facilities are working constantly to fill your caustic soda needs. Use them!

wherever you are... you're close to

DOW CAUSTIC SODA



THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington
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Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

DOW CHEMICALS

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"For outstanding
we use Tiger Brand

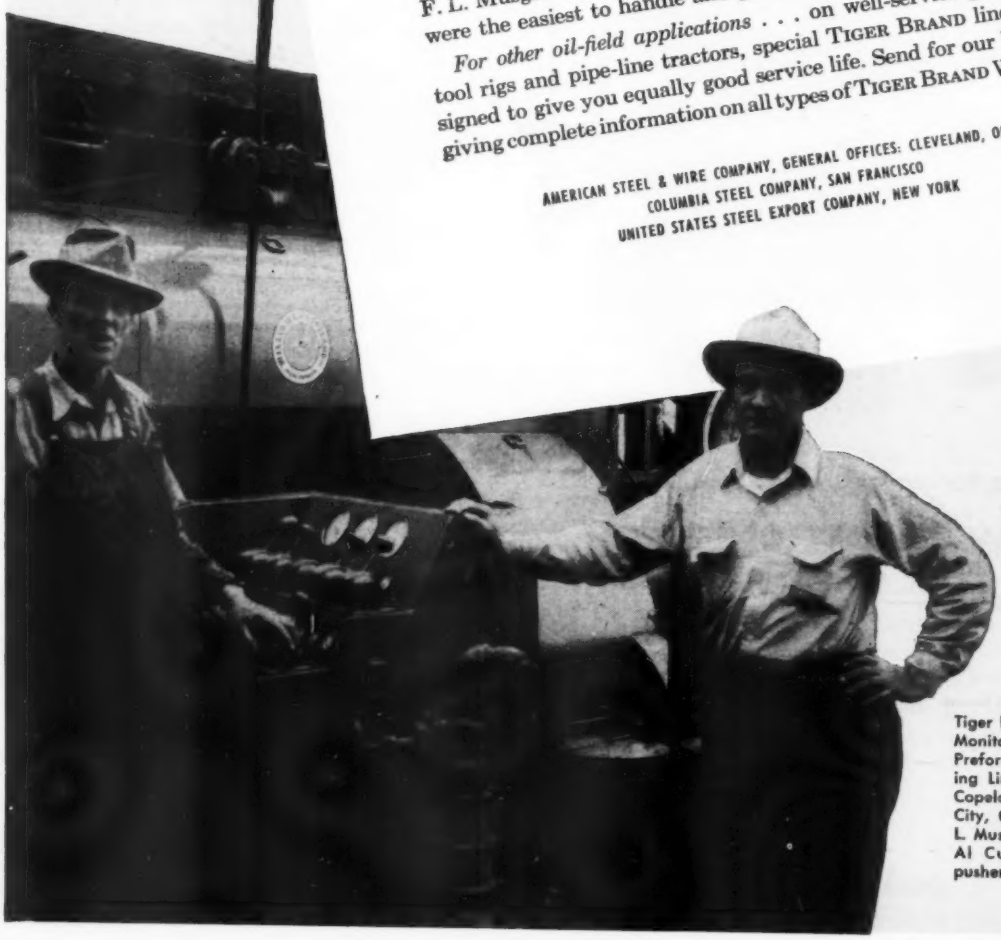
▶ Williams-Copeland, Inc., drilling contractors of Tulsa, Oklahoma, operate ten rotary rigs. They keep accurate service records of their wire lines to determine which one gives them most for their money. The outstanding rotary line is TIGER BRAND, 6 x 19 Monitor Excellay Preformed I.W.R.C. (Independent Wire Rope Core).

"Without doubt," says Mr. Henry Robertson, tool pusher, "this is one of the finest rotary lines ever produced. We always request *American Tiger Brand* because of its outstanding performance and service."

Al Cunningham, another tool pusher for Williams-Copeland, and F. L. Musgrove, driller, agreed that TIGER BRAND Preformed Lines were the easiest to handle and gave least trouble on the job.

For other oil-field applications . . . on well-servicing rigs, cable tool rigs and pipe-line tractors, special TIGER BRAND lines are designed to give you equally good service life. Send for our handbook giving complete information on all types of TIGER BRAND Wire Rope.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



Tiger Brand 1¼" 6 x 19 Monitor Excellay I.W.R.C. Preformed Rotary Drilling Line on a Williams-Copeland Rig in the Elk City, Oklahoma pool. F. L. Musgrove, driller, and Al Cunningham, tool pusher.

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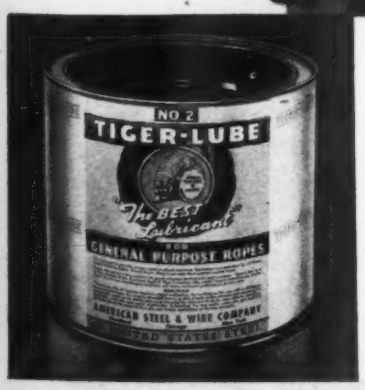
performance and service I.W.R.C.

there's no better rope made"

SAYS H. ROBERTSON OF WILLIAMS-COPELAND, INC.

Henry Robertson, tool pusher says, "There's no better wire rope made than American Tiger Brand. We always request it."



TIGER LUBE wire rope lubricant—the best you can buy. Every Tiger Brand Rope is lubricated with it at the factory. It doesn't throw off in hot weather and retains its lubricating qualities in cold weather. Scientifically formulated for wire rope use. Get it from your supply house.

USS TRADE MARK

AMERICAN TIGER BRAND WIRE LINES

Excellay Preformed

UNITED STATES STEEL

Hard-to-hold

LPG

is an easy assignment for this

Cameron NON-LUBRICATED LIFT-PLUG VALVE

Liquefied Petroleum Gases, such as butane and propane, are rough on ordinary valves . . . particularly those valves which depend on a lubricant for a tight seal. These light hydrocarbons have an affinity for valve lubricants, and once the lubricant is dissolved by the butane or propane, the line product is not only contaminated but the valve no longer effects a shut-off.

LPG is one of a number of difficult services where Cameron NON-LUBRICATED Lift-Plug Valves have turned in an outstanding performance. This valve is unique in that its seat is separate from the valve body. Line pressures tend to improve rather than destroy the geometry of the fit between the seat and plug. Obviously, the separate seat feature permits any desired trim. And, the valve may be completely overhauled without removing it from the line.

Send today for literature on this truly remarkable valve. It may be the answer to your valve problem, too!

Cutaway view, showing plug actuator which lifts, turns and seats plug in ¾-turn of the operating lever.

Renewable seat permits any desired trim for any special service; also facilitates field repair and minimizes maintenance.

CAMERON IRON WORKS, Inc.

P. O. BOX 1212 HOUSTON, TEXAS

EXPORT: 74 TRINITY PLACE, NEW YORK, N. Y.

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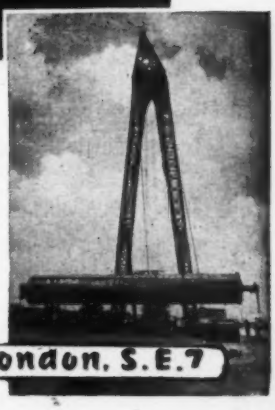
up goes another Harvey Fractionating Column !

Harvey

This Column, fabricated by Harveys, was lowered into the Thames near their London works, towed across the North Sea, lifted from the water at Pernis, near Rotterdam, and soon became an active part of the Royal Dutch Shell Group's New Oil Refinery. Harveys undertake all forms of heavy constructional work for the Oil and many other Industries.

Send for Catalogue OG 750



G. A. Harvey & Co. (London) Ltd. Woolwich Road, London, S.E.7

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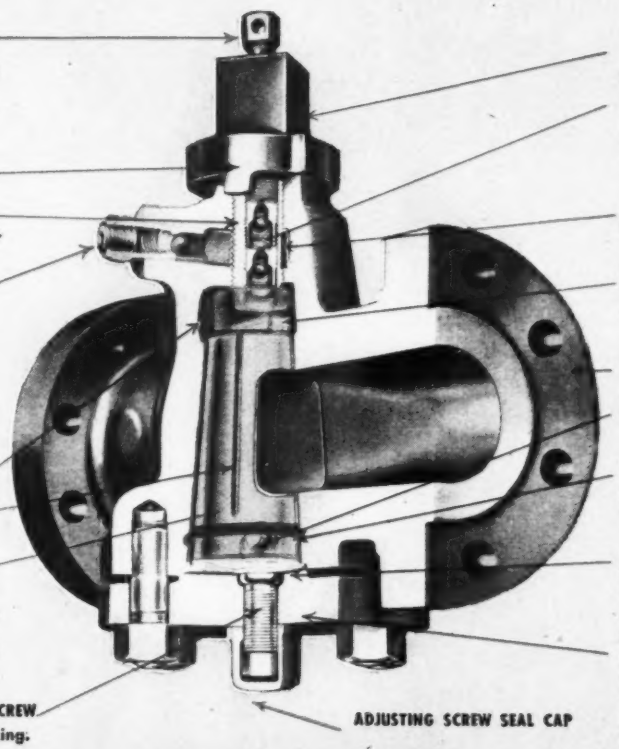
PRECISION ENGINEERED...

HERE ARE FEATURES THAT CAN'T BE TOPPED


LUBRICANT SCREW
Insert lubricant sticks here. Keep system full at all times, and add lubricant sticks whenever screw is down.
STOP COLLAR
THREADED STEM
Not integral with plug. Lubricant sealed.
PACKING INJECTOR
To take up packing tighten Allen Screw If required, aditional plastic stem packing can be inserted under pressure.
LUBRICANT CHAMBER
LUBRICANT GROOVE
Vertical groove in plug.
PLUG
Not integral with stem — therefore full floating and balanced under high pressure.
SEALED ADJUSTMENT SCREW
Packed with stem packing.
WRENCH SQUARE
LUBRICANT CHECK VALVES
Four ball-checks to prevent escapement of lubricant.
ANNULAR STEM PACKING GROOVE
FLOATING EQUALIZER
Transmits torque from stem to plug.
BODY
SEALED SINGLE BALL THRUST BEARING
LUBRICANT GROOVE
Annular groove in plug.
METAL DIAPHRAGM
Hermetically seals bottom of valve.
FORGED STEEL SPRING COVER
Maintains constant tension on plug, keeping plug in seat properly.
ADJUSTING SCREW SEAL CAP

The famous Hypreseal

Every feature points to safety and dependability

You get advantages in Nordstrom valves that have proved dependable for more than 25 years of service. The Hypreseal type, for high pressures, offers a score of finely engineered features. Here is precision line control at its best for the rugged duty imposed in cross country pipe line transmission as well as for positive control in plant operations. Installing Nordstrom valves for replacement of all your troublesome valves progressively reconditions your equipment to a higher level of safety, fewer repairs, less frequent line interruptions and saving in maintenance costs. *Keep upkeep down . . . WITH NORDSTROMS*

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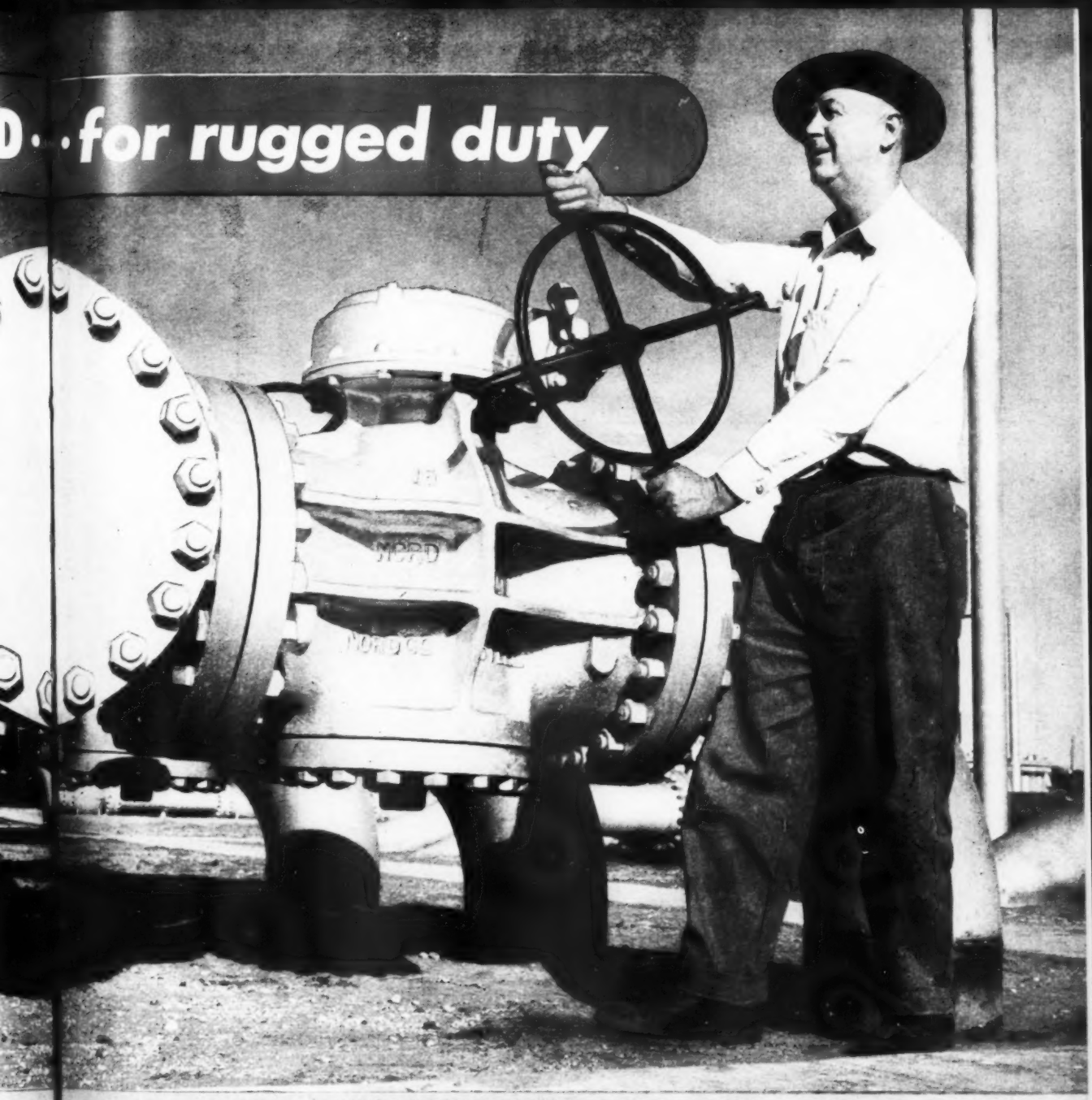

16-INCH NORDSTROM GEAR OPERATED VALVE IN WEST TEXAS

Nordstrom VALVES...NOW AUTOMATICALLY LUBRICATED WITH Hypermatic

Pats. Applied for
Trade Mark

Ask for Gas Pipeline Bulletin V-210 which profusely illustrates major installations, presents maps of pipelines and gives many engineering facts of interest.

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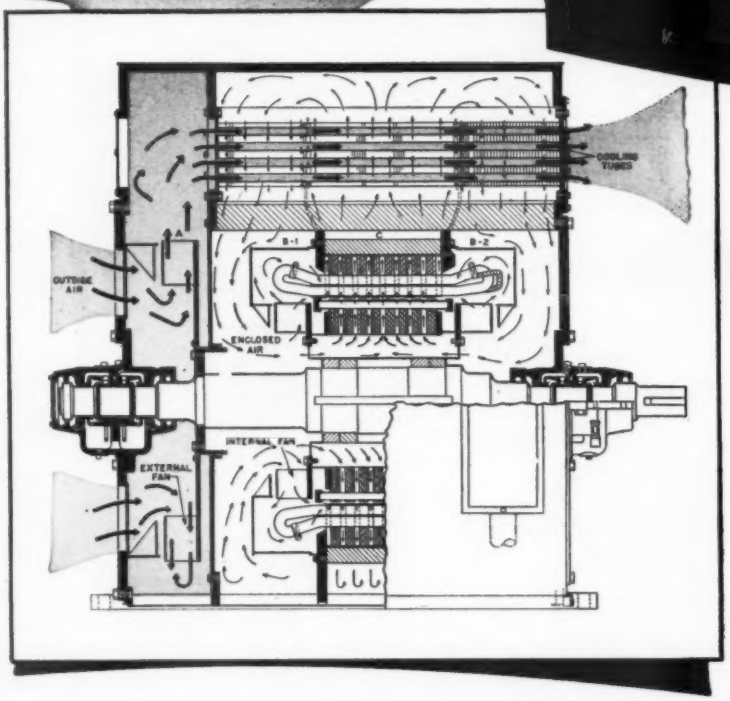
IT'S Heat exchanger COOLED



The NEW ELLIOTT TEFC MOTOR

A carefully designed, highly efficient fan in the external air circuit takes atmospheric air from one end of the motor, circulates it through the inside of a bank of special alloy finned tubes and discharges to atmosphere at the coupling end. Fans on each end of the rotor core circulate air within the closed internal air circuit over coils and core of motor, over finned exterior of tubes of heat exchanger (for cooling) and back to suction of fan again.

It's a simple heat exchange system — with however, certain unique advantages in the design and location of the cooling unit, the arrangement of the air circulating passages, and the housing of Elliott-fabricated steel — crack-proof, rigid, and with rust-inhibiting finish. This new TEFC motor is Elliott motor engineering at its best.

Built in 2-pole ratings 300 to 4000 hp and for lower speeds in sizes equivalent to 50 hp, 14-pole minimum, up to 3000 hp, 4-pole maximum.

WITHOUT STOPPING THE MOTOR the cooling unit can be cleaned, from the coupling end. The straight tubes can be quickly brushed out with simple brush or mechanical tube cleaner as required—a valuable feature under the conditions in which the TEFC motor is generally used.

AIR CIRCULATION IS STRONG AND POSITIVE, in the case of the enclosed air as well as of the outside cooling air.

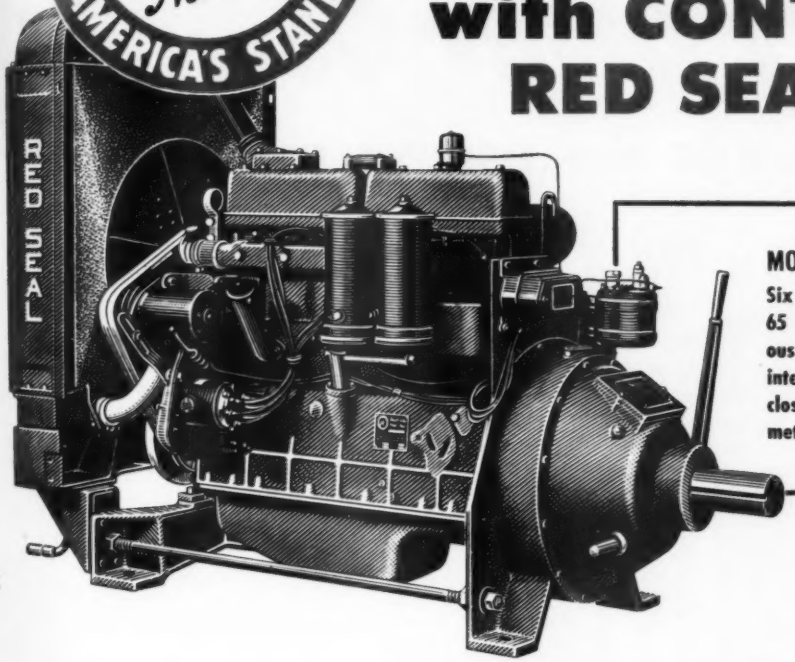
COOLING UNIT CAN BE REMOVED for inspection, cleaning of the finned tubes, or for replacement should corrosive conditions ultimately require it.

NO INCREASE IN FOOT-TO-SHAFT DIMENSION. The cooling unit being located at the top, shaft height permits of the same easy alignment with the driven unit as in the case of a standard motor.

L-805

CUT COSTLY "DOWN TIME" with CONTINENTAL RED SEAL POWER

CONTINENTAL MOTORS — Powerful as the Nation — AMERICA'S STANDARD



MODEL R-600 OPEN POWER UNIT

Six cylinder, overhead valve design. 65 to 110 shaft h.p. for continuous duty—75 to 140 shaft h.p. for intermittent duty. Also available as closed power unit with sturdy sheet metal house with detachable sides.

SEE OUR CATALOG IN COMFOSITE CATALOG

First cost is only one of several vital factors that should enter into the choice of power plants for oil field use. Even more important in the long run is the factor of dependability—the capacity to keep on running with minimum time out.

Recognition of this fact may help to explain the adoption of Continental Red Seal power for an ever-widening range of applications in the petroleum industry. Continental Motors' line of industrial engines and power plants ranges from ¾ to 270 h.p., and includes one or more models engineered to the needs of almost every oil field job within those limits, not only in the producing end, but in processing and distribution too.

This wide diversification does away with the necessity of hit-or-miss matching of the power to the work.

You'll cut costly down time—clinch top *dependability*—by standardizing on built-for-the-job Continental Red Seal power.

6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • • • 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF.

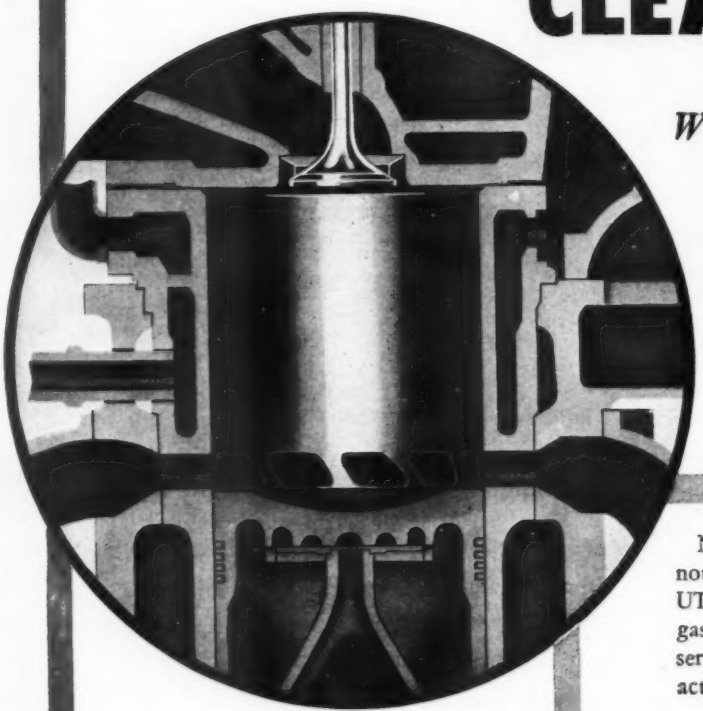
Continental Motors Corporation
MUSKEGON, MICHIGAN

HERE'S THE

Vital Power Center

THAT ASSURES THE UNIFLO UTC-16 A

"CLEAN SWEEP"



Worthington's timed scavenging system proves a valuable aid to outstanding gas engine compressor performance

ESSENTIAL FEATURES

- complete removal of exhaust gas
- more thorough charging with gas and air
- positive timing for optimum combustion
- effective supercharging
- low operating temperature prevents carbonization
- uniform cylinder temperature results in equal wall stress eliminating harmful stresses.

RESULTS: less down-time . . . lower-cost maintenance . . . higher efficiency.

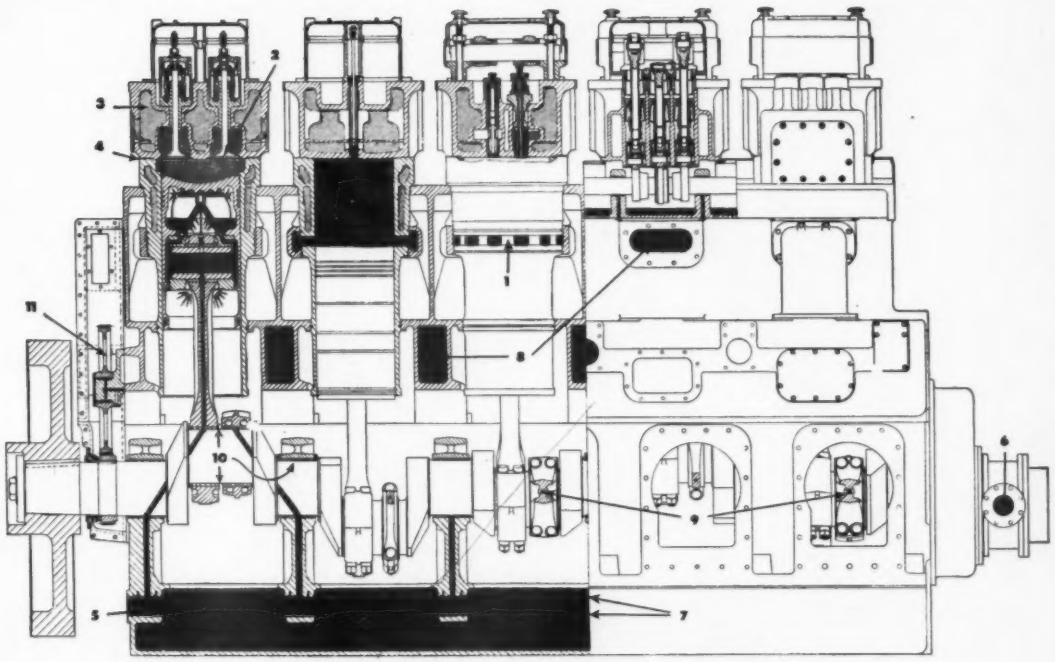
Nothing in recent years has attracted as much notice as the quick success of Worthington's uniflo UTC-16. For, here is peak economy and efficiency in gas transmission and many petroleum processing services — proved by exhaustive testing under actual working conditions.

Uniflo Scavenging . . .
A Truly Great Improvement

A major factor in the UTC-16's outstanding performance is the Worthington uniflo scavenging principle. Concentrated in the *Vital Power Center* — see illustration — the uniflo method assures a thorough-going "clean sweep" resulting in many bene-

WORTHINGTON

XUM



Advanced Features Of The UTC-16

1 360° inlet ports with directional flow.

2 Large exhaust valves. Cam-operated — positive timing — extra large exhaust passages.

3 Cylinder head cooling. Large passages — water carefully directed for uniform cooling.

4 Metal-to-metal joints. Cylinder heads seat on liners — no gaskets.

5 Positive lubrication. Entire running gear pressure lubricated.

6 Lube oil pump. Low speed direct connected . . . readily accessible.

7 Cast-in lubricating oil manifolds. Jointless — no internal connections — large sump.

8 Large scavenging air supply. Multiple air pumps — reciprocating type two scavenging reservoirs one on each side of engine — large elbows from reservoirs to ports.

9 Well-spaced compressor cylinders. Complete accessibility of cylinders and crossheads — permits use of large cylinders.

10 Large bearing area. Low unit pressure . . . cool running . . . long life . . . four studded bearing caps . . . precision-type bearing shells.

11 Gear driven camshaft. Positive, quiet operation.

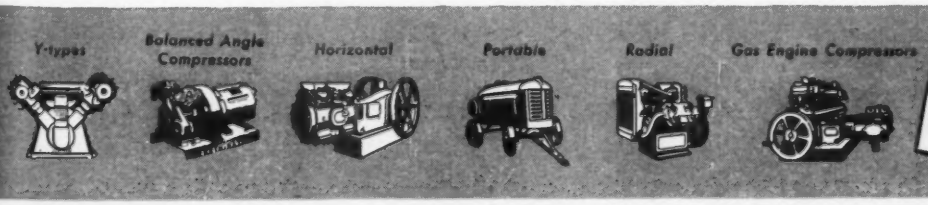
fits for smoother operation. It is the first time this type of scavenging has been adapted to engine compressor duty and its incorporation with the advanced over-all UTC-16 design marks the beginning of a new era in lower-cost, more dependable performance.

Versatility

While designed primarily as a pipeline gas engine compressor, the UTC-16 is suitable for many other services, including: pressure maintenance on oil wells . . . in natural gasoline plants . . . in oil refineries, for solvent extraction, vapor recovery, recycling and stabilization of gases . . . in petrochemical processing of products made from natural gas under pressure . . . in many refrigeration applications.

The uniflo UTC-16 is built in sizes ranging from 800 to 2,000 hp. If you have a process where gas must be compressed, and a suitable gas fuel is available, make a point of investigating this outstanding angle gas engine compressor. For further proof that *there's more worth in Worthington*, contact our nearest Branch Office, or write the *Worthington Pump and Machinery Corporation, Engine Sales Div., Buffalo, N. Y.*

EK 1.1.



NO OTHER COMPRESSOR WILL OUTPERFORM A WORTHINGTON

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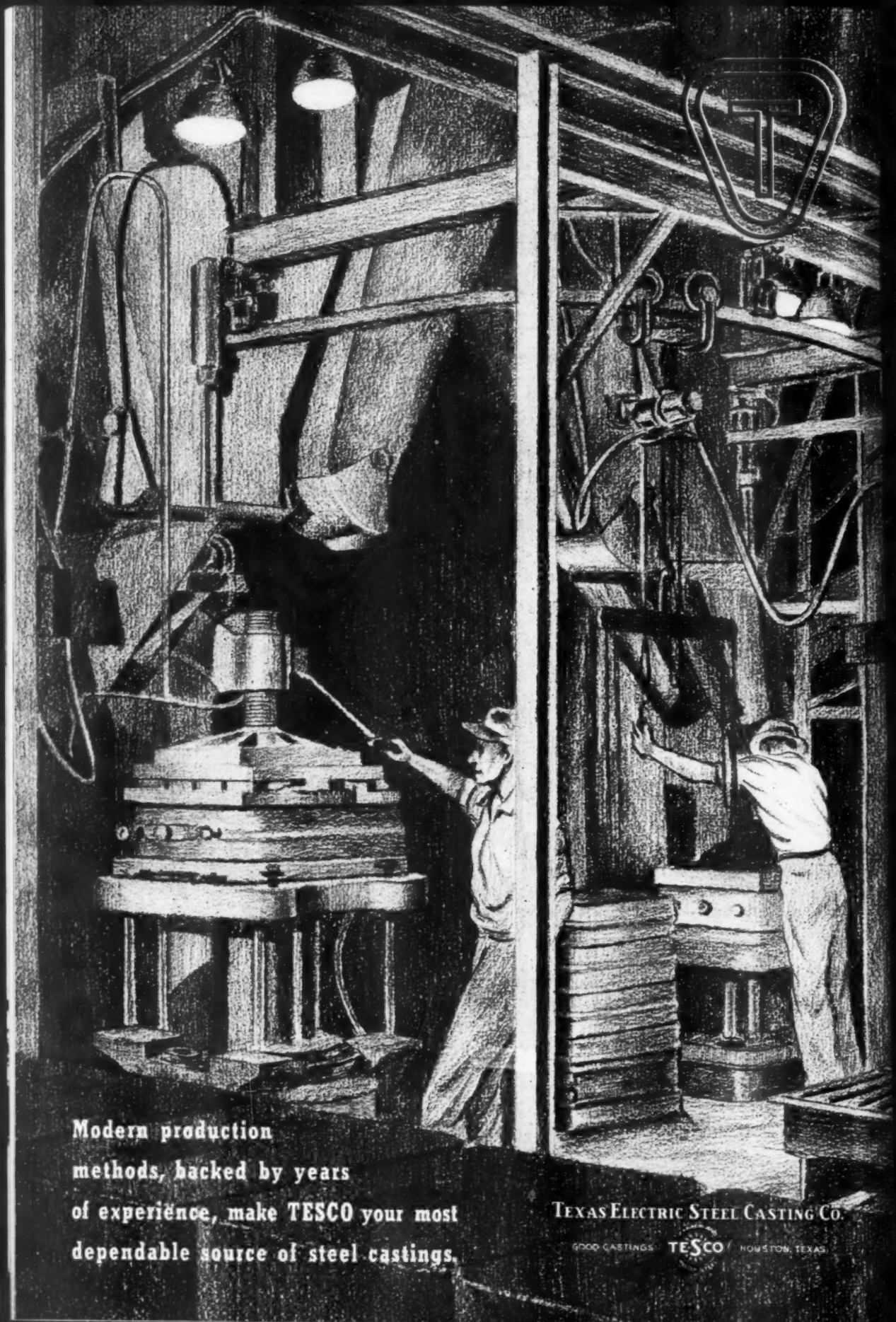

Modern production methods, backed by years of experience, make TESCO your most dependable source of steel castings.

TEXAS ELECTRIC STEEL CASTING CO.

GOOD CASTINGS TESCO HOUSTON, TEXAS

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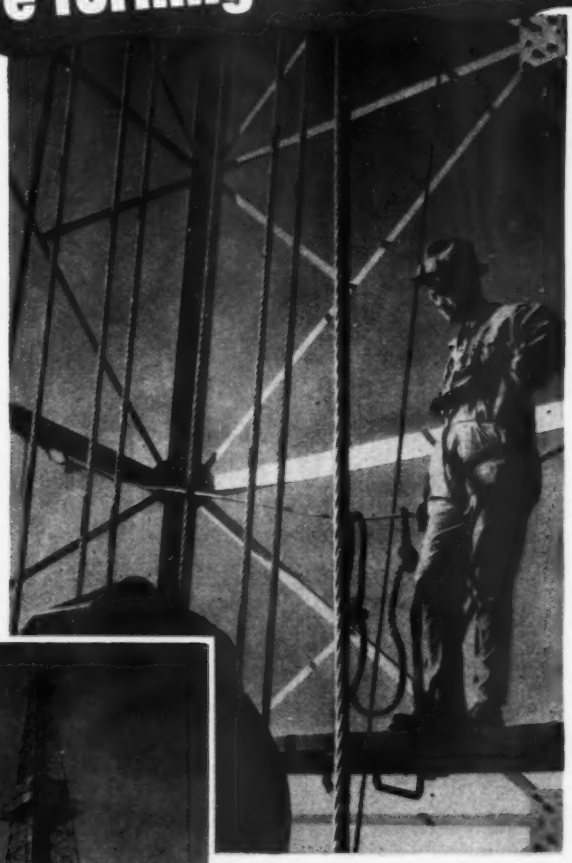
Drillers Who Know Their 3 C's

- COST of Replacement
- COST of Downtime
- COST of Operating

J&L STEEL

Are turning to J&L Wire Rope



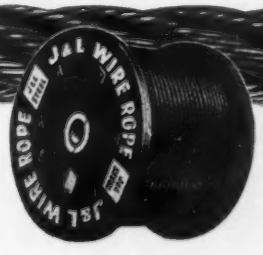
It doesn't take a wizard at mathematics to figure out that low operating costs mean economical operation and higher profits. That's why more and more smart drillers throughout the oil country are ordering J&L drilling lines for their rotary or cable tool rigs. Experience has proved that they'll get maximum service life—maximum hole per wire rope dollar with J&L.

The long service life of J&L Wire Rope is due to J&L's "quality controlled" method of manufacture. "Quality control" ensures the finest finished product by controlling every step in the manufacture of the wire rope from the mining of the ore to the final stranding and closing operations.

The result—long service life on the job, that's reflected on the balance sheet in low cost for wire rope, minimum downtime for rerigging and less manhours spent installing new lines—in short, lower operating costs.

In addition, the popularity of J&L Wire Rope in the oil country is built on more than long service life. The men on the rigs like it too because it's easy to handle, spools smoothly, and is lubricated with J&L's exclusive Bronze-lube—the lubricant that's clean to handle, doesn't run out when the line gets warm.

If you're not already using J&L drilling lines, it will pay you to find out more about J&L quality controlled Wire Ropes. Why not contact your nearest J&L Wire Rope representative today?



JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

SUPPLY BOVAIRD COMPANY

With PETROLEUM and....

Aviation is a great development made possible by your petroleum industry. In 1903, when the Wright Brothers made the first successful flight, Bovaird had been serving the growing oil industry for 32 years. Today, after 80 years of service to, and growth with the oil business, Bovaird gratefully acknowledges the friendship and confidence of the industry in the past and its opportunity and responsibility to serve in the years ahead.

Bovaird's experienced personnel, complete stocks and 22 strategically located offices and stores are ready at any time to give the fast, dependable service you want.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

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KANSAS—Chase, Great Bend, McPherson, Pratt, Russell, Wichita
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Ringwood, Sapulpa, Seminole, Tulsa
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"Buy From Bovaird"

THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

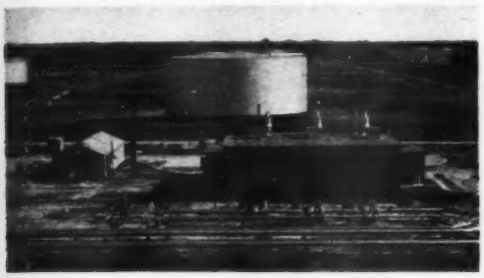
80 YEARS OF PROGRESS WITH THE OIL INDUSTRY

Here's real pumping power for Pipe Lines

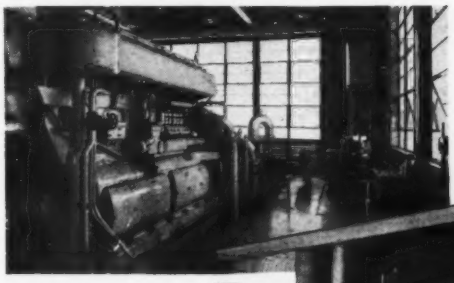
ALCO Diesel engine pumping installation at Patoka Station of The Texas-Empire Pipe Line Company System uses NO spare units.

Operation of these Alco diesels is so reliable that the Patoka Illinois Station uses no spare units—and yet must be ready at all times to pump vital crude oil by pipe line to refineries and connecting carriers. That's why Alco medium speed Diesels have been picked for the job. These dependable engines have operated 96% of the elapsed time at 94% of the manufacturer's rating, using centrifuged line crude for fuel. Operation is so reliable that the station uses no spare units. Such dependable performance is the chief reason why in the last ten years *more Alco Diesels have been installed in oil pipe line pumping service in the U. S. and Canada than any others.* For more details check now with American Locomotive Company, 30 Church Street, New York 7, or the nearest Alco Sales Office at Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady, St. Louis.

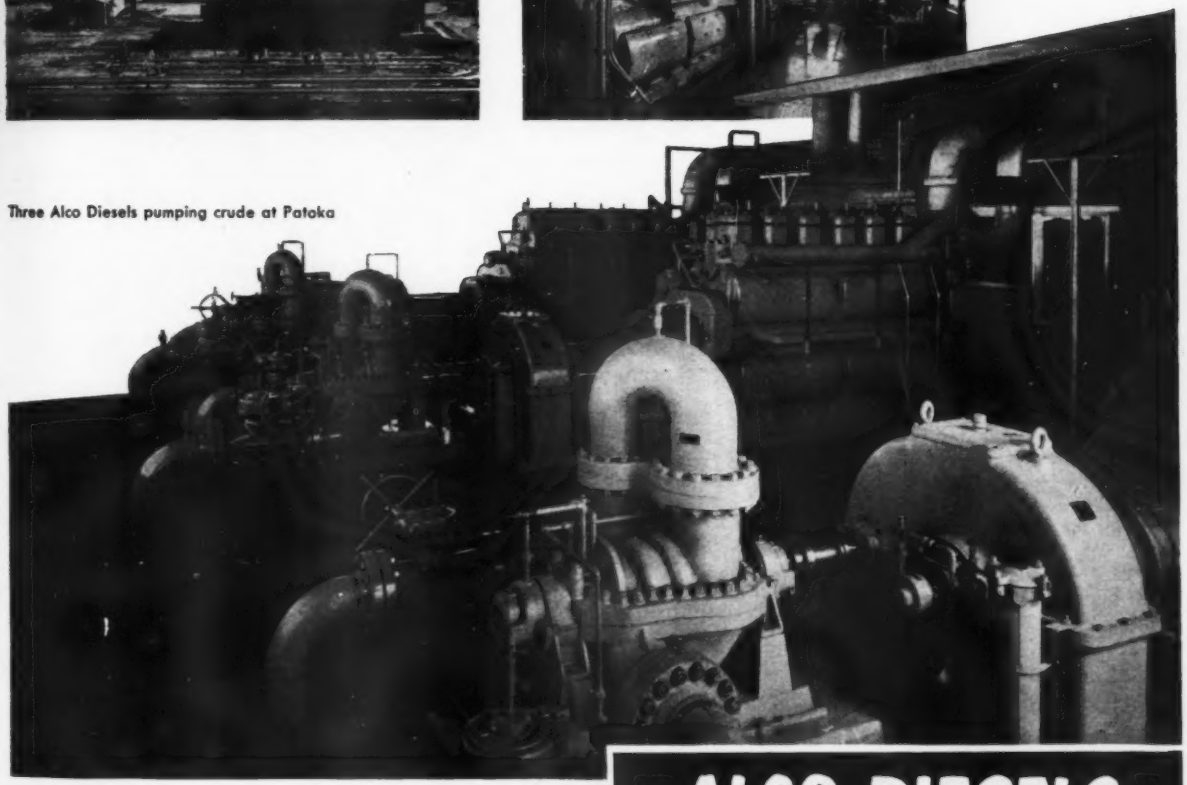
Outside view Patoka Pumping Station



Close-up view of one of the Alco Diesels at Patoka



Three Alco Diesels pumping crude at Patoka



SPEED Vs. WEAR

Remember, since piston speed and journal travel per minute are both almost the same in medium speed and slow speed engines, wear is equivalent as well. Not only do you get unequalled dependability with Alco Diesels—you get long wear and low maintenance costs, no matter how difficult the service conditions.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY

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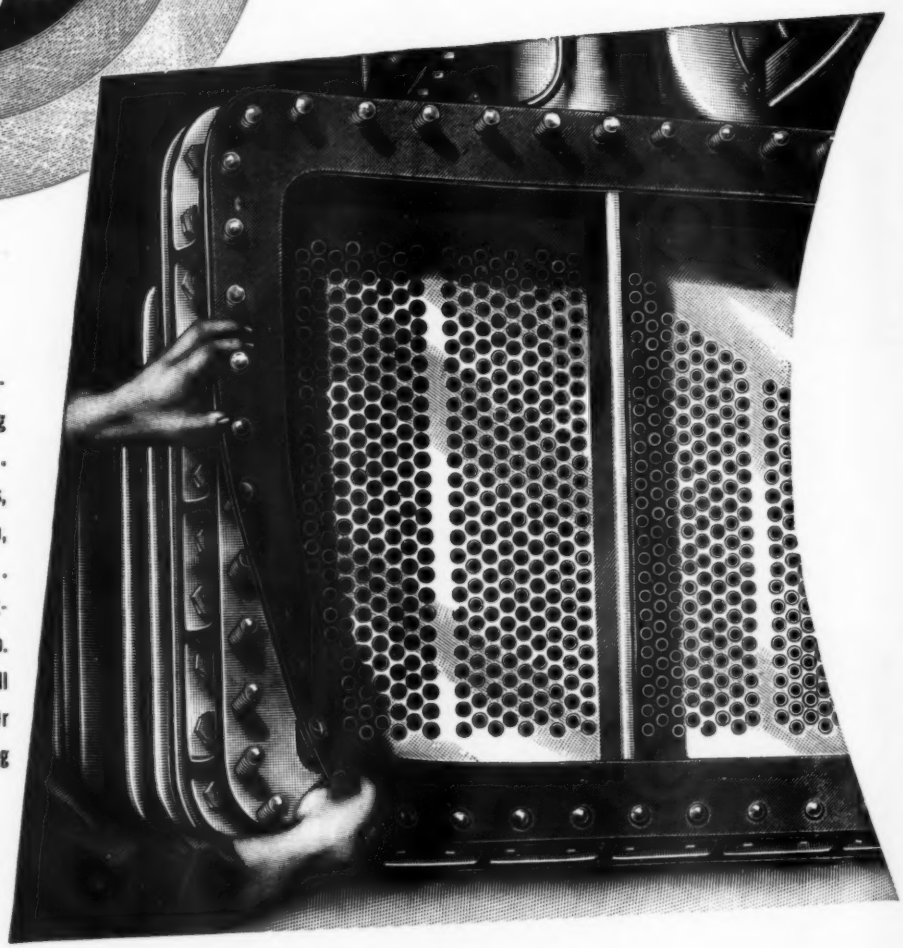
IT'S PACKED WITH SATISFACTION WHEN IT'S PACKED WITH R/M



Gaskets like this for Freon condensers may not be your packing problem, but whatever it is . . . high pressures, high temperatures, chemicals, refrigerants, petroleum, food or other products . . . Raybestos-Manhattan has a packing or gasket designed for the job. Your nearby R/M distributor will help you solve your problem. Or write for the new R/M Packing Catalog.

R M

PACKINGS

RAYBESTOS-MANHATTAN, INC.

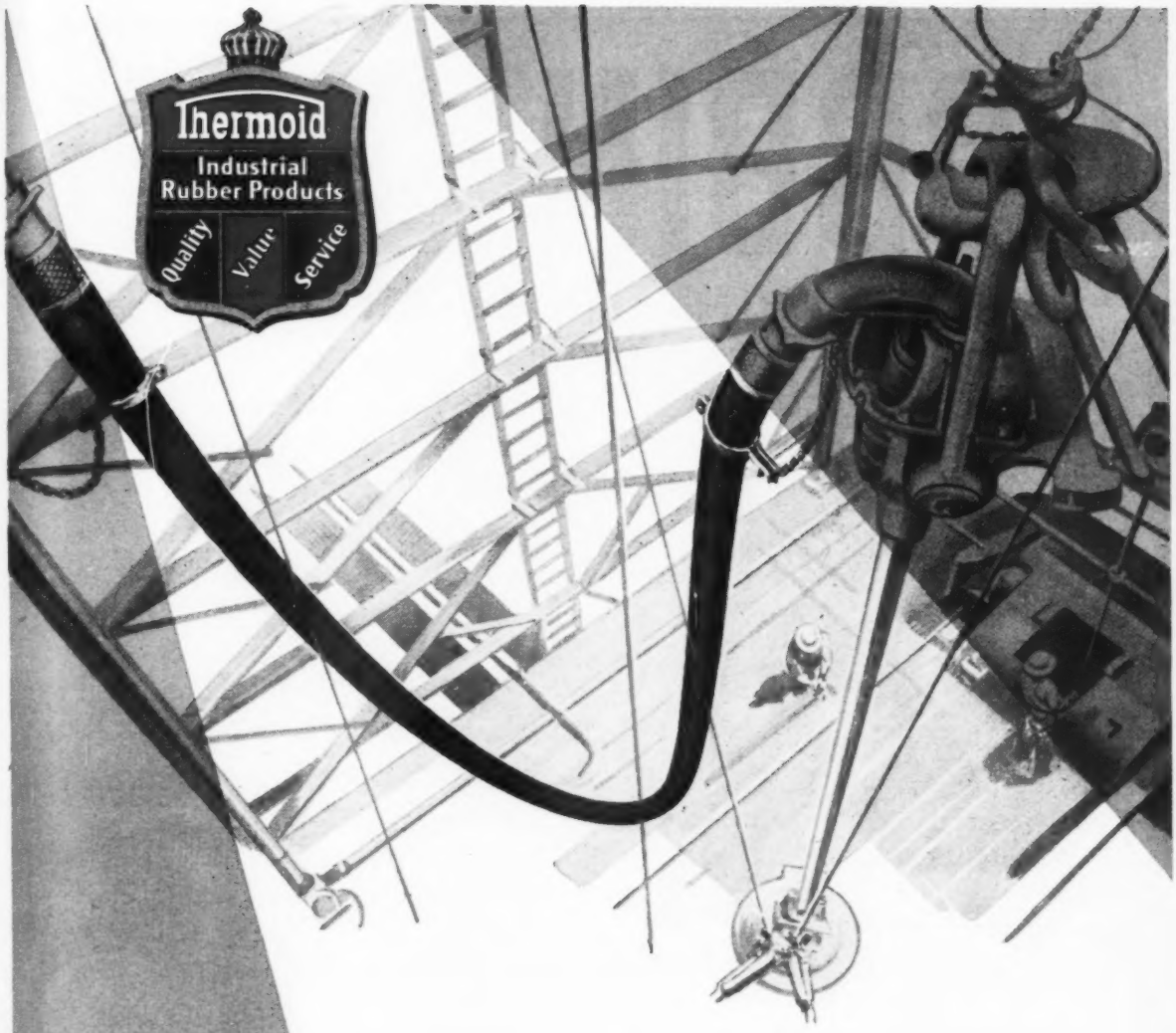
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Packings • Asbestos Textiles • Mechanical Rubber Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Powdered Metal Products • Bowling Balls

XUM

XUM



Powerflex Rotary Hose Is Pre-tested Under Tougher Than Field Conditions

Thermoid Powerflex Rotary Hose is tested to 5000 psi before shipment. And that's a far greater pressure than it will ever meet in the oil fields.

But Thermoid Powerflex can take it. Because, like all Thermoid products, it is made with an extra margin of safety and endurance.

The tube is oil-and-abrasive resistant synthetic rubber, reinforced with steel cables and pre-stretched fabric. Cover resists aging, abrasion, cracking. Couplings are built in, and anchored securely for the life of the hose.

Throughout the oil fields everywhere, Thermoid has come to mean safety, dependability, long-wearing economy—whether it's Powerflex Rotary Hose, "No-Wip" Line Savers, wire line turnbacks or any other Thermoid quality product.

Mid-Continent Office and Warehouse: Houston, Texas

SEE OUR CATALOG IN THE COMPOSITE CATALOG

Powerflex Rotary Hose • Trioflex Slim-Hole Rotary Hose • Mud-Flo Slush Pump Hose • Flexible Discharge Units • F.H.P. and Multiple V-Belts • Oil Country Flat Belting

Thermoid

Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

XUM

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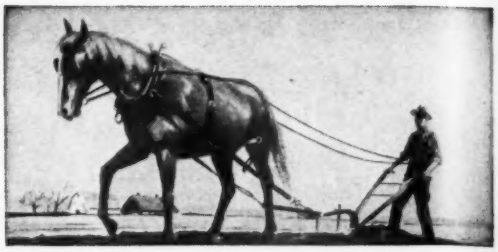
DOBBIN



DOESN'T WORK HERE ANY MORE!

TODAY, mechanical horsepower has revolutionized American farming—helps produce almost 90,000,000 tons more food than in 1930—uses over 3 times as much petroleum!

Is it any wonder companies like Socony-Vacuum have to keep on their toes—constantly planning and "plowing back" for the future?

Two years ago, for instance, Socony-Vacuum spent $158,000,000 for oil exploration, advanced research, new pipelines, tankers, refinery and storage facilities—to help fill U.S.A.'s yearly demand for 2,080,000,000 barrels of petroleum.

And we still have a big job ahead!

The Nation's needs for Security — *your* demands for a big money's worth in oil for homes, transportation, industry and farms all must and *will* be met.

This calls for bigness—and America has it!

SOCONY-VACUUM

DEMAND DETERMINES BIGNESS

The Flying Red Horse Companies: SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:

MAGNOLIA PETROLEUM COMPANY • GENERAL PETROLEUM CORPORATION

XUM

Pittsburgh Seamless Still Tubes

You get long uninterrupted service in your refinery equipment with Pittsburgh Seamless Still Tubes. The complete metallurgical control exercised during steel making, processing and final heat treating is your assurance that Pittsburgh Still Tubes have the proper physical properties and chemistry to give you uniform resistance to heat, pressure oxidation and corrosion.

Pittsburgh Seamless Still Tubes are made in a full range of carbon and alloy steels—2″ to 6″ outside diameter (in some cases even larger) from .134″ to 1″ average or minimum wall thickness in lengths up to 55′ with plain or upset and machined ends.

Operators everywhere know they can keep their flow continuous with economy with Pittsburgh Still Tubes. Pittsburgh Steel Company, Department OG, Pittsburgh 30, Pa.

The Steel Industry Needs Scrap—Keep it Moving

Pittsburgh Seamless Still Tubes

a product of

Pittsburgh Steel Company

MACK TRUCKS

Get Things Done!

● Extra effort—that's the order of the day as American industry swings into high gear to meet the growing demands of the nation's expanding defense program.

Nowhere is this more important than on vital construction work and on the job of keeping raw materials flowing from the mines, the forests and the oil fields.

Here's work that's cut out for Mack trucks... jobs where big Macks show at their best in *extra* strength and stamina, *extra* performance and *extra* dependability.

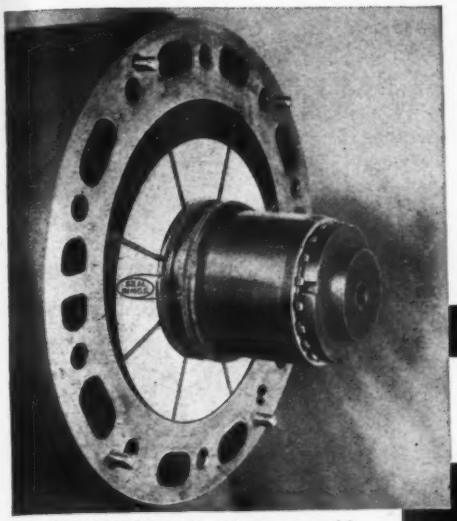
Your nearest Mack branch or distributor will show you how Mack's exclusive design and construction can boost output on your particular job... *get things done* faster and at lower cost. You'll find it's a story well worth hearing.

Mack TRUCKS

...outlast them all

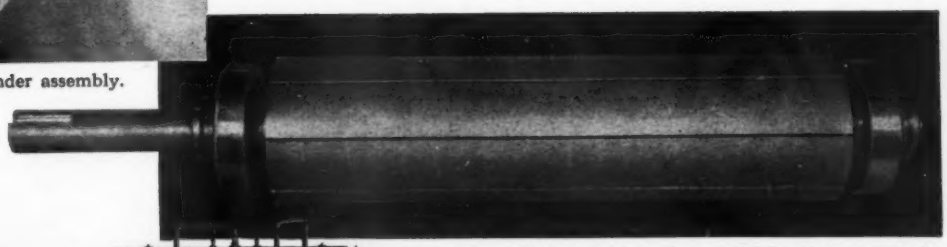
Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Mack Model LMSWX diesel-powered six-wheeler serving Smulcer Trucking Co. of Wichita Falls, Texas.

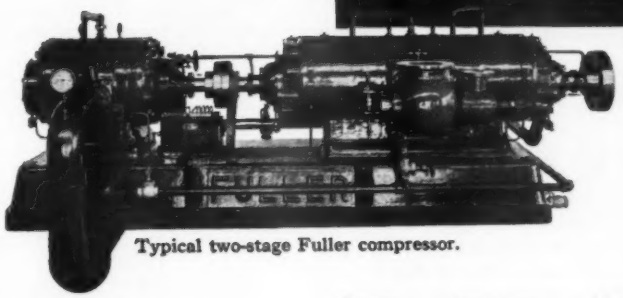


Rotor blades and cylinder assembly.

a lot of maintenance men have never seen inside a FULLER COMPRESSOR



Accurately balanced, steel rotor with bearings mounted.



Typical two-stage Fuller compressor.

Rotor . . . bearings . . . blades—the only moving parts in a Fuller Rotary Compressor. There you have the three reasons why these compressors keep out of the repair shop. Fuller's efficient "heart" is your guarantee of economical and dependable service.

These are some of the important advantages of the Fuller Rotary—the reasons why thousands of these compressors are quietly and efficiently working for industry today: steady flow—no air-line pulsations, no valves to leak, direct drive from electric motor or internal combustion engine, simple foundation and small floor space, **maintained** capacity and efficiency for the life of the machine.

Whether your requirements call for a single-stage, two-stage or duplex combination, Fuller has the compressor **(to 125 psi. and 3300 cfm)** that will do the job better—longer. Investigate the Fuller Rotary Compressor. Complete information is given in Bulletin C-5. It's yours for the asking.

Fuller

DRY MATERIAL CONVEYING SYSTEMS
AND COOLERS • COMPRESSORS AND VACUUM PUMPS
FEEDERS AND ASSOCIATED EQUIPMENT

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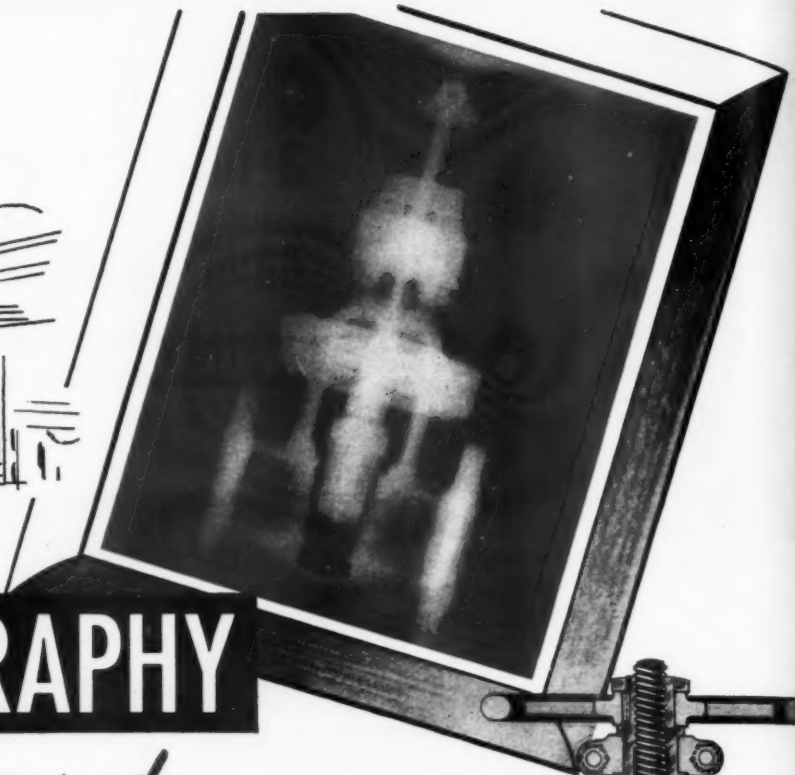
C-217



RADIOGRAPHY

reveals sound

LUNKENHEIMER STEEL CASTINGS

Radiographic waves search the internal structure of Lunkenheimer steel gate valves, exposing the dense, sound quality of their castings. The smooth tone of this short-wave gamma ray photo is your final assurance of soundness in the steel valve you depend on for round-the-clock petroleum service. Other tests guard the Fig. 1751 from imperfections after every manufacturing process — from foundry to final assembly. It's especially engineered and tested for 150 lb. pressures in the oil industry.

For service on your oil or oil vapor lines, specify body-bonnet-trim combination WB2. Body and bonnet are of cast carbon steel, and special oil-trim is of 13% chrome stainless. The same valve is also available for steam and other non-lubricating fluids . . . specify Fig. 1751 WB6.

The disc rises clear of the straight-through, streamlined port-to-port flow to minimize turbulence and pressure drop. Backseating faces let you repack the valve while it's wide open and under pressure.

Write for your free copy of "Lunkenheimer Oil Industry Valves," a circular in color describing more than fifty bronze, iron, and steel valves, "service engineered" for the petroleum industry. Address: The Lunkenheimer Co., Box 360F, Cincinnati 14, Ohio.

Figure 1751 Steel Gate

STEEL ● IRON ● BRONZE

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-151-37

PETROLEUM CHEMICALS DIVISION

NEWS

DU PONT REG. U.S. PAT. OFF.

April ★ One of a Series of Interest to the Petroleum Industry ★ 1951

Du Pont Antioxidant No. 5 Put to Unusual Use by Steel Company

The Kaiser Steel Corporation at Fontana, California has put Du Pont Gasoline Antioxidant No. 5 to an unusual use. This was done in their by-products coke department carbon disulphide tower, which runs secondary light oil from the coking unit.

Previous to the use of Antioxidant No. 5, the tower was shut down periodically about every 3 months for a clean-out because of increased back pressure resulting from a flaky residue in the trays. The first operational run after the Du Pont additive was used lasted 13 months before a shut-down was necessary.

Costwise, the antioxidant addition more or less balanced the direct cost of the more frequent shut-downs. But the inconvenience and the indirect costs of the interrupted operation more than tipped the scales in favor of the inhibitor.

Du Pont Explosives and Know-how Help Locate Oil Deposits

As petroleum men know, wildcatting for oil in an unproved area is no longer as wild a gamble as it used to be. Where once the driller depended chiefly on surface indications and a general knowledge of the local geology, he now seldom starts until he has seen an underground "map" of the area.

Here a seismic shot has just been fired. The explosive used was Du Pont's "Nitramon" S.

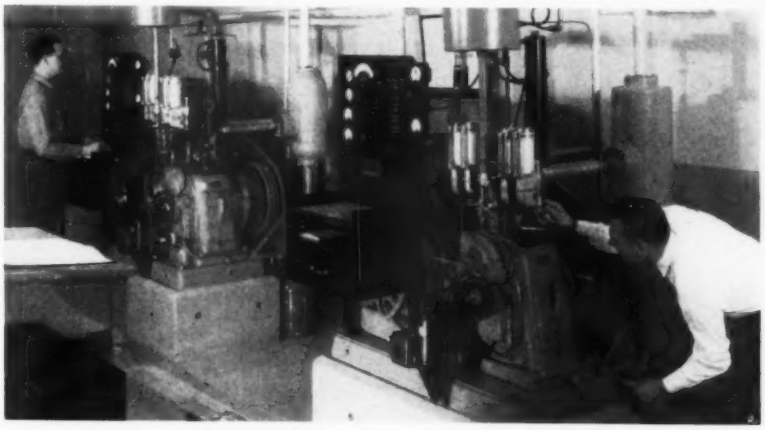
With such a "map" he has a good chance of knowing where salt domes, anticlines, rock faults, limestone reefs and other formations likely to "trap" oil are located.

These sub-surface pictures are made possible through geophysical methods of prospecting, the most widely used of which is seismic prospecting. Charges of explosives, averaging about 15 pounds in weight, are loaded into specially drilled shot holes in the ground. When these are fired, shock waves go out in all directions through the earth. As they meet the various layers of limestone, sandstone, etc., a portion of their energy is reflected back to the surface. Sensitive geophones catch and record these "echoes" on strips of sensitized paper. The developed strips are turned over to technicians who interpret the records and plot the results on maps that show, with remarkable accuracy, where oil may be found. Thus, the use of a few pounds of explosives can often save drilling at a place where there is little or no chance of finding oil.

Representatives of the Explosives Department of Du Pont are well informed on the subject of seismic prospecting. They represent another of the many diversified groups in Du Pont who make their specialized knowledge available to the petroleum industry.

Chicago District Office Organizes One-Day Training Courses For Oil Company Personnel

In keeping with the Petroleum Chemicals Division policy of being of help to refiners in every way possible, Du Pont's Chicago district office has recently organized one-day educational clinics for oil company personnel.



Part of the Chicago District Laboratory showing two ASTM knock test engines in operation.

These clinics tie in with the indoctrination efforts of oil companies located in the Chicago area. Such companies periodically call in various of their personnel for training courses which take them through operations, credit, accounting, research and other departments.

The program offered by Du Pont is flexible. It consists of laboratory talks and demonstrations on Du Pont products, discussions on automotive maintenance, and safe handling practices in connection with TEL and other Du Pont additives.

A typical day's tour of Du Pont's Chicago facilities might start in the laboratory. Here the trainees would receive a thorough explanation of the function of the CFR engine. They would see one or more of these engines in operation.

At this point a slide talk on the motor method and the research method of determining octane numbers of gasoline might be introduced by Dr. A. B. Wilder, laboratory manager.

The response of gasoline to TEL would be described. Also the significance of the various physical tests that are normally applied to gasoline. The physical properties of TEL and other Du Pont additives would also be made clear to the students in the course.

ADVERTISEMENT — Prepared for the Petroleum Chemicals Division of E.I. du Pont de Nemours & Company (Inc.)

OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED Training Courses

Another feature on the program would include a talk by H. E. Cissley who is the Du Pont fleet, bus and tractor expert in the Chicago district. With an impressive background in truck manufacture and maintenance covering many years, Mr. Cissley can be counted on to give an interesting and instructive presentation on the subject of maintenance and other problems concerning automotive equipment.

In the matter of safe handling practices connected with TEL, tank entries, tank cleaning, and hazards having to do with tetraethyl lead in general, Frank Grubb gives a presentation that always proves interesting to his hearers.

At the end of a full and strenuous day, the meetings are brought to a close with a brief portrayal of other Du Pont departments, products and operations.

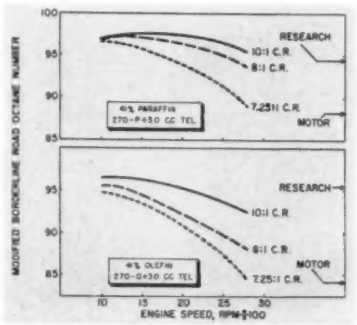
From this there is invariably one conclusion – the petroleum industry contributes much to Du Pont . . . and Du Pont, with its additives and finishes, its neoprene and nylon, its explosives and chemicals – and its research – in turn contributes much that is of value to the petroleum industry.

Road Tests Show Effect of Compression Ratio on Road Octane Rating

To examine the fuel chemical characteristics involved in obtaining maximum road antiknock performance and lead response, Du Pont's Petroleum Laboratory has conducted an extensive series of road tests. These tests were made in cars with engines representative both of today's designs and those of the future. In the program, a total of some 2500 separate road ratings were made on 42 leaded and unleaded gasoline blends.

One of the major conclusions drawn from this work was that in high compression ratio cars, at high speed, the road ratings of the fuels increased markedly with compression ratio, thus making the road octane numbers of fuels more nearly constant throughout the speed range.

Typical examples of the effect of increased compression ratio causing an increase in road octane rating are shown in the graph for two fuels, one containing all paraffins (270-P) and the other all olefins (270-O) in the 270°F. to E.P. fraction. This tendency toward increased road octane rating in the high speed range with increasing compression ratio was consistent with all of the test fuels.



Typical effect of compression ratio on the borderline ratings of two types of test fuels.

Complete data and results of this project are available in a paper, "The Effect of Hydrocarbon Structure on the Road Antiknock Performance of Motor Fuels."

Medical Director for Petroleum Chemicals Division

DR. STEWART L. RANKIN is medical director of the Du Pont Petroleum Chemicals Division. He and his associates are at the service of customers at all times to help safeguard the health of employees working with TEL compounds.

Dr. Rankin graduated from Bucknell University with a Bachelor of Science degree in biology in 1926. He then studied at Jefferson Medical College, receiving his M.D. degree in 1930. After a period as an insurance company medical examiner, he became assistant director of Student's Health Service at Lehigh University.

Dr. Rankin joined the medical staff of Du Pont's Chambers Works in 1937. In 1940 he was appointed a physician at the Indiana Ordnance Works, a Du Pont built and operated war plant. He later became medical supervisor at this plant. In 1944 he was made superintendent of the medical department of the TEL plant at Baton Rouge, Louisiana. In 1946 he came to Wilmington.

LITERATURE AVAILABLE

The Petroleum Chemicals Division of Du Pont has published a wide variety of material of interest to the petroleum industry. This includes technical papers, bulletins, reports and memoranda as well as equipment operation bulletins, safety regulations, tank cleaning data, marketing aids and the like.

Any of this is available on request to your nearest Du Pont Petroleum Chemicals Division District Office. A partial listing of available material is shown below:

Blending Calculator for Du Pont TEL Compound (Aviation Mix) . . . . . Serial A-1210

Tank Talk—A 52-page booklet which outlines safe procedure for cleaning gasoline storage tanks. Written for the man who does the cleaning . . . . . Serial A-1134

Du Pont Services to the Petroleum Industry . . . . . Serial A-663

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

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A-1846

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BROWN FINTUBE
Thermo-Flo
TANK HEATERS

easy to install in new—or existing—tankage

Single Heater Installation | Heaters Manifolded on the Outside | Heaters Manifolded on the Inside | Heaters Manifolded on the Inside | Heater Mounted on Roof Manhead

Users report that the cost of a group of Brown Fintube Thermo-Flo Tank Heaters — plus their installation — is less than the cost of just installing a bare pipe heating coil of equivalent capacity.

● Brown Fintube Thermo-Flo Tank Heaters are vastly superior to the old method of heating with a coil of bare pipe installed in the bottom of the tank. Thermo-Flo Heaters mount vertically, practically eliminating any depositing on the tubes. They avoid heating through a layer of sediment, and set up a thermal flow or siphon within the tank that assures thorough, rapid heating, avoiding stratification.

Thermo-Flo Heaters are compact units. They pass through a standard manway with ample clearance. They can be installed quickly; disconnected easily; and cleaned or repaired *outside* the tank.

The TF-20 Heaters, pictured above, have 265 square feet of surface. They are highly endorsed by operating and maintenance men, built in large quantities and are moderately priced. Available in mild steel, stainless steel, monel, inconel, aluminum, admiralty and other non-ferrous alloys to meet any requirement.

Write for Bulletin No. 491. It gives full details.

THE BROWN FINTUBE CO.
ELYRIA, OHIO

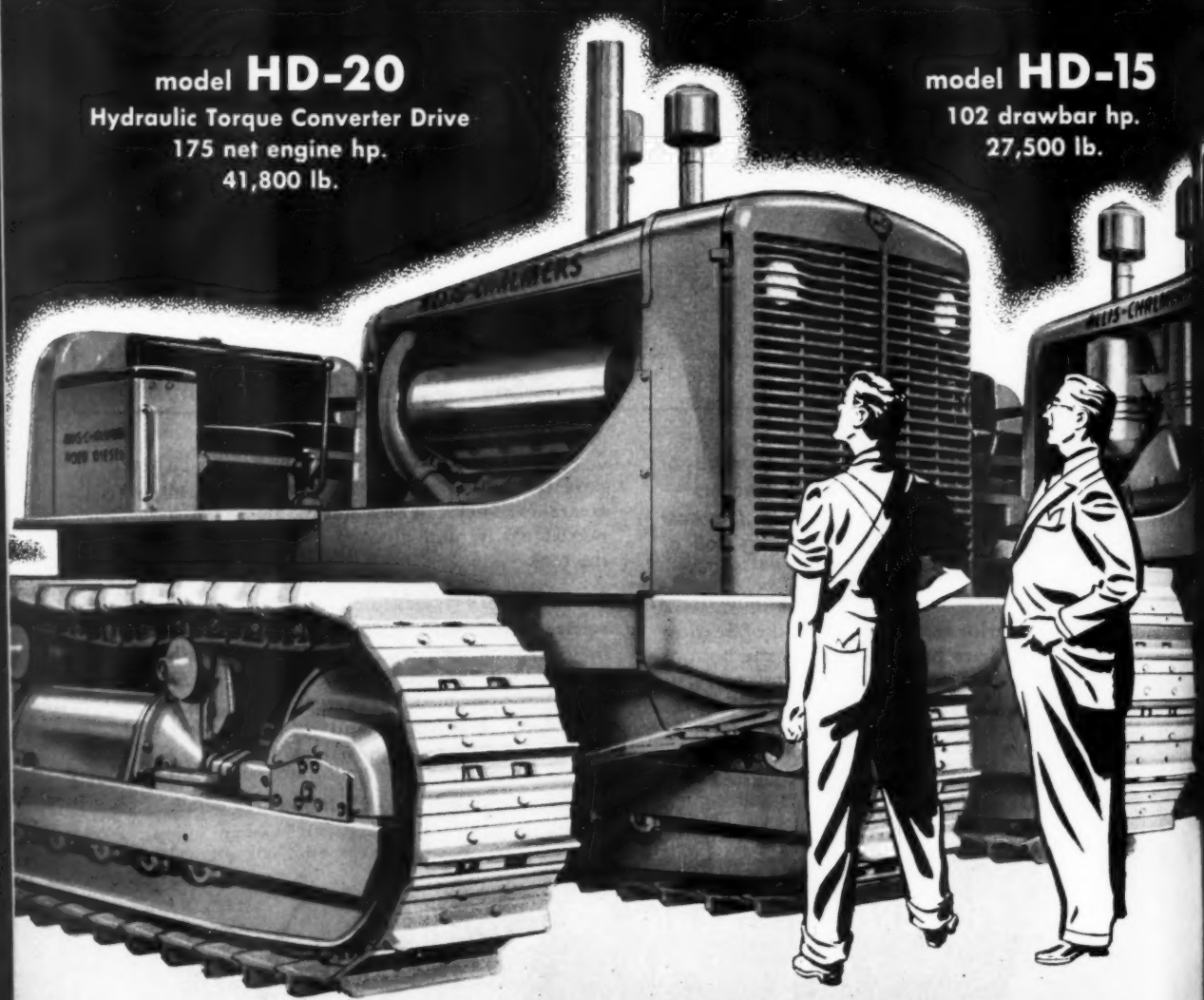
FINTUBE HEAT TRANSFER PRODUCTS

ALLIS-CHALMERS
Sets New Standards

. . . THE NEWEST, FINEST

model **HD-20**
Hydraulic Torque Converter Drive
175 net engine hp.
41,800 lb.

model **HD-15**
102 drawbar hp.
27,500 lb.



Get the full story from your Allis-Chalmers dealer.
See these tractors perform. They're built for YOUR job!

XUM

for Tractor Performance
for Lasting Durability
for Simplified Servicing
for Ease of Operation

TRACTOR LINE ON EARTH

model **HD-9**
70 drawbar hp.
18,500 lb.

model **HD-5**
40.26 drawbar hp.
11,250 lb.

Originator of the Torque Converter Tractor

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

XUM

Every Aldrich Direct Flow Pump shown here is operating on present-day water flood projects. The growing number of Aldrich Pumps at work on water flooding or water disposal is proof of Aldrich's qualifications to take care of your requirements—regardless of volume or pressure needed.

Note these reasons why you can consider Aldrich Direct Flow Pumps specially "designed-for-the-job":

- Reduced space between valves affords higher volumetric efficiency.
- Among 3-, 5- and 7-plunger units of the same stroke size: all wearing parts are interchangeable, and a choice of large or small fluid-ends affords a wide range of plunger selection and makes it possible to change plunger size with minimum investment in new parts.
- Operating speeds have been increased—resulting in greater volume and higher pressure from a lighter, more compact pump.
- Drive by direct connection to synchronous engine type, slow speed motor is available, if desired; and all units feature low engine mounting.
- Aldrich "KOSMOS" Porcelain Plungers and valves made of stainless steel or other special material are available to keep corrosion, wear and maintenance time—*down!*

Contact your nearest Aldrich Representative . . . or write us direct for information. Data Sheets are always available on request.

(1) 2⅛" x 3" Triplex..... 500 rpm
2,360 bbl per day.....1100 psi

(2) 1¾" x 5" Triplex..... 320 rpm
1,540 bbl per day.....2500 psi

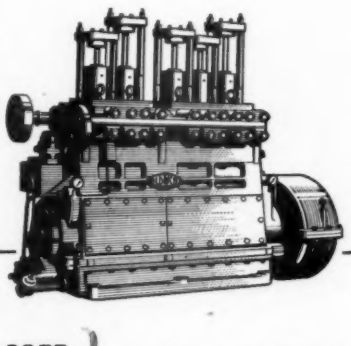
(3) 3¼" x 5" Quintuplex..... 360 rpm
11,100 bbl per day..... 713 psi

(4) 2⅞" x 5" Septuplex..... 375 rpm
11,900 bbl per day..... 910 psi

(5) 4" x 6" Triplex..... 277 rpm
8,720 bbl per day.....1545 psi

(6) 2⅛" x 6" Quintuplex..... 250 rpm
3,160 bbl per day.....5400 psi

(7) 3½" x 6" Septuplex..... 250 rpm
15,000 bbl per day.....2020 psi



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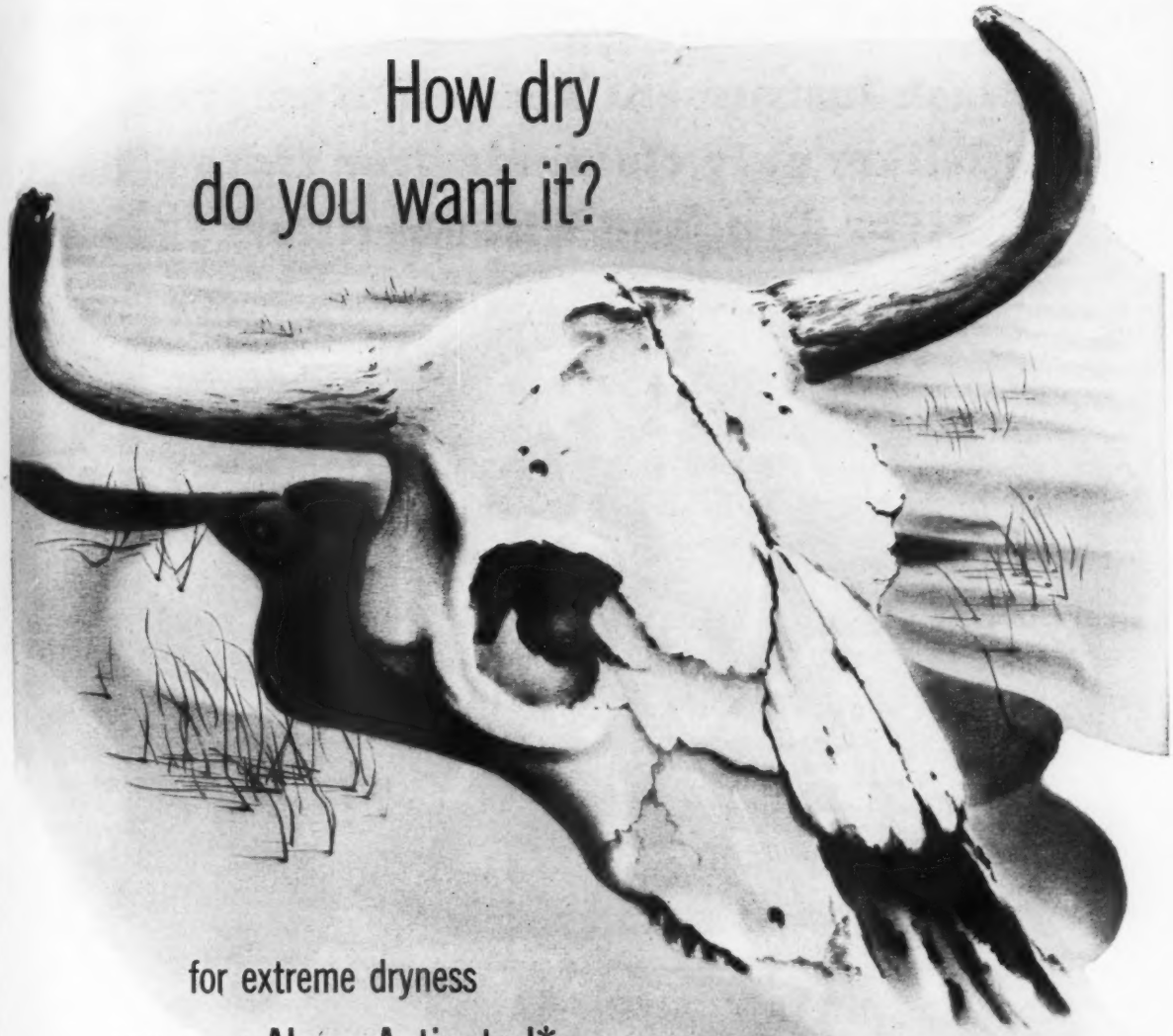
How dry do you want it?



for extreme dryness you need Alcoa Activated* Alumina

Every day more and more petroleum companies are discovering the efficiency and economy of ALCOA *Activated* Alumina for the dehydration of liquids, vapors and gases. They know that it's one of the most effective desiccants they can buy. Dew points as low as *minus 100° F.*—and even lower—can be obtained, and ALCOA *Activated* Alumina can be used for an almost indefinite number of drying cycles.

ALCOA *Activated* Alumina has high resistance to crushing, shock and abrasion . . . will not soften, swell or disintegrate even when immersed in water . . . is non-toxic . . . non-corrosive . . . high in purity . . . practically iron-free.

ALCOA *Activated* Alumina is used to adsorb certain gases and vapors from gaseous mixtures, and serves as a catalyst and catalyst carrier.

What do you dry? How dry do you want it? Whatever your answer, it will pay you to investigate ALCOA *Activated* Alumina. We will gladly send you complete information. Write to: ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 618D Gulf Building, Pittsburgh 19, Pennsylvania.

FREE—A color print of this illustration on heavy 12" x 18" stock, without advertising matter, suitable for framing. Write us.

** Reg. T.M., Aluminum Co. of America*

Alcoa Chemicals

ALUMINAS and FLUORIDES

ACTIVATED ALUMINAS • CALCINED ALUMINAS • HYDRATED ALUMINAS • TABULAR ALUMINAS • LOW SODA ALUMINAS ALUMINUM FLUORIDE • SODIUM FLUORIDE • SODIUM ACID FLUORIDE • FLUOBORIC ACID • CRYOLITE • GALLIUM

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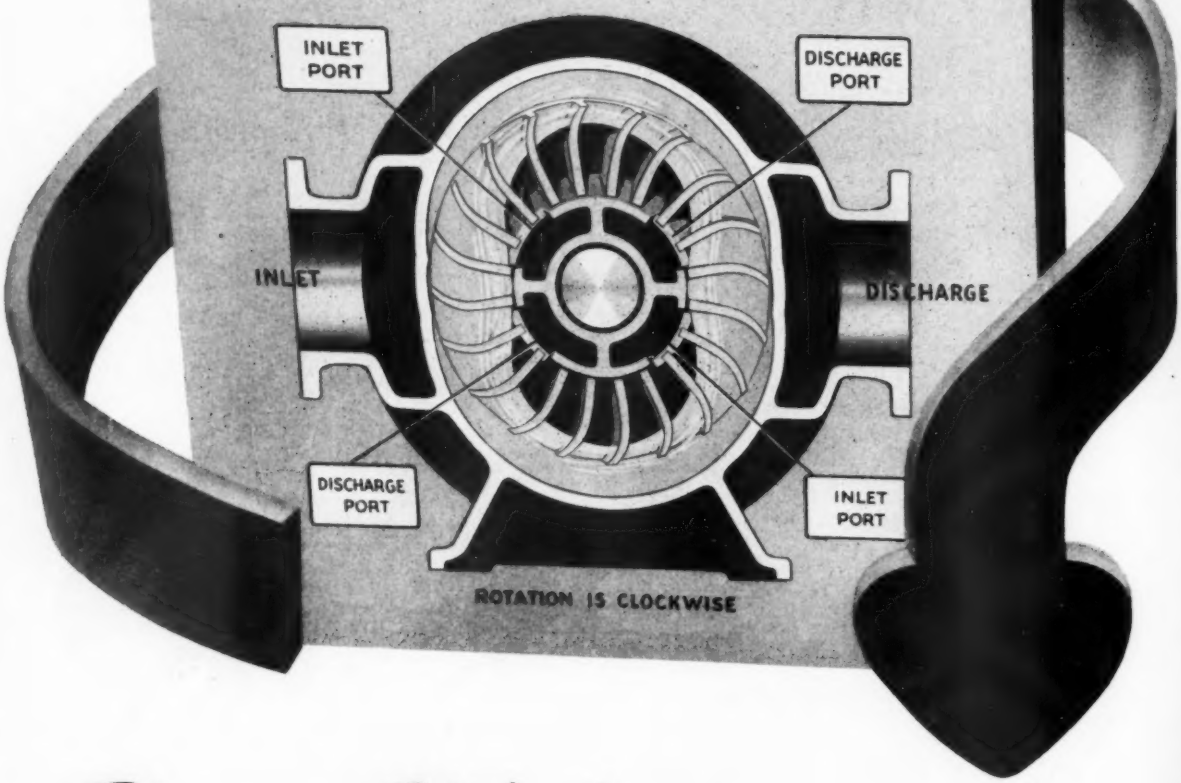
Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

- No oil filters.
- No dust filters.
- No internal lubrication to contaminate air handled.
- No internal wearing parts.
- No valves, pistons, or vanes.
- Non-pulsating pressure.
- Original performance constant over a long pump life.
- Low maintenance cost.

NASH ENGINEERING COMPANY
395 WILSON, SO. NORWALK, CONN.

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Finest Buy in the Land . . . on *Every* Count!

NEW 1951 CHEVROLET

Advance-Design TRUCKS

These new 1951 Chevrolet trucks are tops in value. They're tough and rugged. They're loaded to the brim with power. They're thrifty . . . move massive loads . . . handle like no other truck. Chevrolet's latest haulers have 51's finest new features, too. Features like new, super-effective brakes that are extra-safe and easy to operate. Features like Chevrolet's Dual-Shoe parking brake, Chevrolet's new Ventipanes and new cab seats that bring you comfort with a capital "C." Visit your Chevrolet dealer and look over these great new trucks. You'll find the right truck for *your* job!

CHEVROLET MOTOR DIVISION, *General Motors Corporation*
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CHEVROLET

ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • **POWER-JET CARBURETOR** — for smooth, quick acceleration response • **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement • **SYNCHRO-MESH TRANSMISSIONS**—for fast, smooth shifting • **HYPOID REAR AXLES**—for dependability and long life • **NEW TORQUE-ACTION BRAKES**—for light-duty models • **PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES**—for medium-duty models • **NEW TWIN-ACTION REAR BRAKES**—for heavy-duty models • **NEW DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models • **NEW CAB SEATS**—for complete riding comfort • **NEW VENTIPANES**—for improved cab ventilation • **WIDE-BASE WHEELS**—for increased tire mileage • **BALL-TYPE STEERING**—for easier handling • **UNIT-DESIGN BODIES**—for greater load protection • **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

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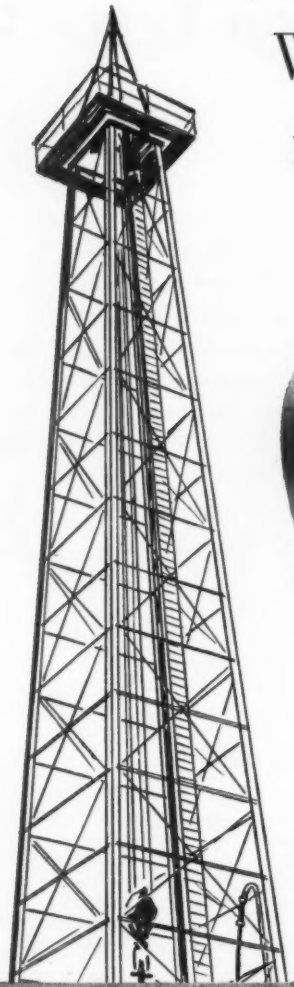
What's U. S. Rubber doing for your drilling dollars?



THIS NEW "U. S." PIPE PROTECTOR prevents wear on the casing or tool joint. Lowers vibration, friction and torque during drilling, resists cutting, abrasion, swelling and the effects of oil and acid. Knurling on the inside protects against seepage or slippage. Can be used with any kind of drilling mud.

NEW DOUBLE-LIP PIPE WIPER gives twice the wiping action of a single-lip wiper at single-lip cost. Does the work of two single-lip tandem wipers, and the field reports amazing service. Lips will stretch five times their size without damage.

MANY OF THE LARGEST makers of rotary drilling rigs select U. S. Matchless Packing (below) as original equipment. Its self-adjusting, automatic action reduces wear on rods and plungers at pressures as high as 8,000 lbs. psi.

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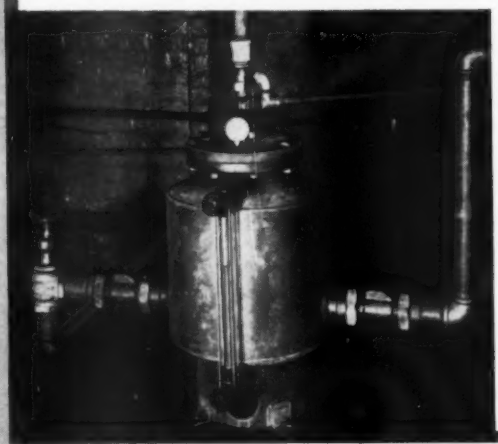
PENBERTHY CYCLING JET PUMPS



Operated by air, gas, or steam pressure, pumps (without clogging) any liquid that will flow through pipes. Lifts fluid from lower level and discharges against pressure approximately equal to operating gas pressure. Operates automatically by ejector that exhausts the vessel . . . drawing in liquid . . . then gas pressure pushes it out. Ejector and its control valve not in contact with fluid pumped. Corrosion proofing easy. Write for Bulletin 5030.

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Motor and switch totally enclosed, this pump has Underwriters approval for Class I, Group D, and Class II, Groups E, F and G hazardous locations. These include gasoline, solvent vapors, metal dust, natural gas, carbon black, naphtha, alcohol, grain dust, acetone, lacquer, coal and coke dust, etc. Made of copper and bronze throughout, this pump is corrosion proof, durable, thoroughly dependable. Write for Bulletin 4929.

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"Biggest threat to the entire (natural-gas) industry today is that the Federal Power Commission will succeed in its efforts to move in with maximum prices so low and arbitrary as to discourage industry expansion or cause unreasonably cheap gas to displace oil for the fuel market. FPC power grab represents no less a threat to future state income from this industry.

"Unless gas is permitted to seek its competitive price, out-of-state demand may grow to proportions that would be contrary to the interests of the oil industry and state in general."

TIPRO Reporter, Texas Independent Producers and Royalty Owners' Association.

Home Towns First

"The states, it seems, cannot prohibit the export of gas produced therein, but on the other hand, it is suggested that they can discourage it through severance or other taxes peculiarly applicable to irreplaceable natural resources. . . .

"In any case, it should be possible to secure preference for Oklahoma homes, schools and industries over the demands of northern and eastern industries in times of emergency, such as occurred in Oklahoma in February."

—Editorial in the Enid, Okla., News.

Proper Question

"Only a few months ago some people in Washington and some people in Akron were saying that our supply of rubber was ample to our needs.

"Now we find that the spare tire is disappearing from new autos.

"This country built during World War II a synthetic-rubber industry capable of producing more rubber each year than we used back in pre-World War II days. Output of natural rubber in the Far East has been big in recent months.

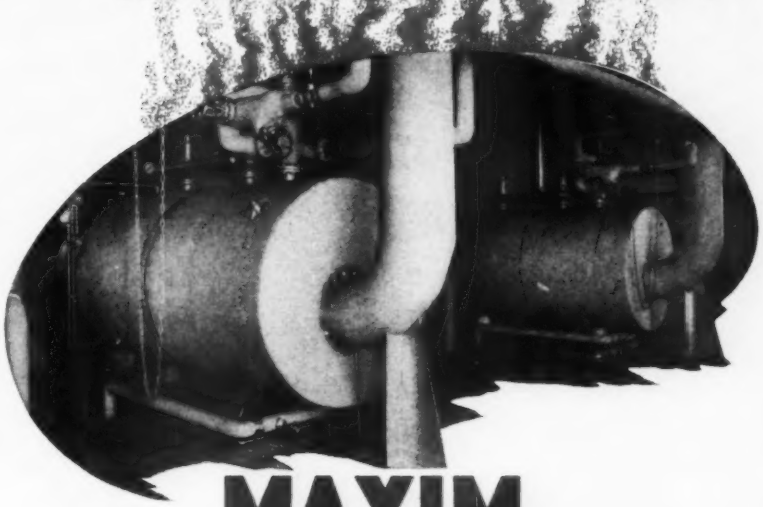
"Why, then, have we worked ourselves into a no-spare-tire stage?"

—Editorial in the Wall Street Journal.

Death to the Industry?

"Power-mad left wingers are responsible for the silly proposal to lower the 27½ per cent depletion given on the production of petroleum. With the world's fourth largest oil field, located in Iran, under a constant threat of seizure by the Communist Russian Government, and with Communist forces seeking to infiltrate into the South American oil fields,

IS WASTE HEAT WASTING YOUR MONEY?



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HEAT RECOVERY SILENCERS CONVERT WASTE EXHAUST HEAT TO USABLE STEAM or HOT WATER

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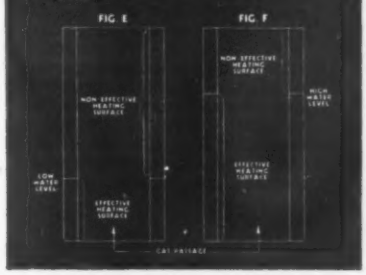
Perhaps your own operating expense picture can be improved by this simple and effective way to provide extra steam or hot water for heating or processing operations while at the same time effectively silencing exhaust noise. Our engineering department will be glad to make recommendations.

Automatic Controls

In figure E water is low and there is less *effective heating surface* (heating surface in contact with water), hence lower steaming rate.

In figure F water is high and gives greater effective heating surface — higher steaming rate. Steam pressure regulated valves control the amount of water to produce desired steam capacity.



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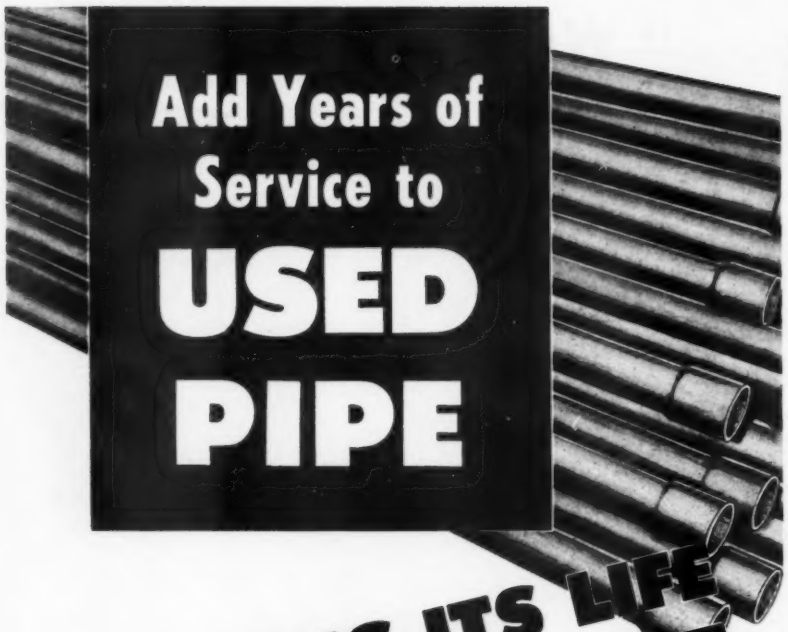

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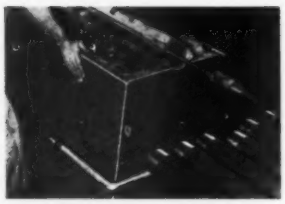

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PREVENTS TROUBLE ON THE INSIDE!

It is often possible to greatly increase the life and usefulness of old oilfield pipe by using the Tube-Kote plant-controlled process. This proven method of cleaning and coating with "T K-2" thermo-setting (baked-on) plastics assures a tough, extremely durable protective coating on the inner surfaces of oilfield tubular goods. Prevents corrosion from the inside, ends paraffin deposition, eliminates many costly "shut-downs" due to pipe failures.

A view of the Tube-Kote baking ovens which can handle over 12,000 feet of tubular goods per hour.

TUBE-KOTE

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it would certainly be unwise to reduce the incentive to explore for oil. . . .

"Suppose the Russians do cut us off from outside sources of oil, and suppose Congress reduces the incentive to search for oil in the United States. Then, we would be short of oil. Immediately there would be a clamor for more oil production, and the only way possible to get it would be to raise the price of crude to offset any reduction in the depletion allowance. It would be simply a matter of cutting off our nose to spite our face, if Congress should unwisely reduce the depletion allowance."

—*Editorial in the Stillwater, Okla., News-Press.*

CALENDAR

April

Brussels International Fair, twenty-fifth annual event, Brussels, Belgium, April 21-May 6.

Southern Gas Association, Buena Vista and Edgewater Gulf hotels, Biloxi, Miss., April 23-25.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, Society of Exploration Geophysicists, joint annual meeting, Jefferson Hotel, St. Louis, April 23-26.

Indiana Independent Petroleum Association, spring convention, Oliver Hotel, South Bend, Ind., April 25-26.

Natural Gasoline Association of America, annual convention, Mayo Hotel, Tulsa, April 25-27.

Indiana Gas Association, French Lick Springs Hotel, French Lick, Ind., April 26-27.

Pacific Coast Research Conference, Berkeley, Calif., April 26-27.

Interstate Oil Compact Commission, spring meeting, La Fonda Hotel, Santa Fe, N. M., April 26-28.

American Gas Association, industrial and commercial gas section, industrial gas school, William Penn Hotel, Pittsburgh, April 29-May 4.

American Geophysical Union, thirty-second annual meeting, National Academy of Sciences, Washington, D. C., April 30-May 2.

American Petroleum Institute, Division of Refining, sixteenth midyear meeting, Mayo Hotel, Tulsa, April 30-May 3.

Materials Handling Conference, International Amphitheatre, Chicago, April 30-May 4.

May

American Oil Chemists' Society, spring meeting, Roosevelt Hotel, New Orleans, May 1-3.

American Institute of Electrical Engineers, District 1 meeting, Hotel Syracuse, Syracuse, N. Y., May 2-4.

Fuel Oil Distributors Association of New Jersey, annual convention, Berkeley-Carteret Hotel, Asbury Park, N. J., May 3-4.

Pennsylvania Petroleum Association, Inc., annual spring convention, Bedford Springs Hotel, Bedford, Pa., May 6-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, May 7.

American Gas Association, Natural-Gas Department, Dallas, May 7-8.

Independent Petroleum Association of America, midyear directors' meeting, Cosmopolitan Hotel, Denver, May 7-8.

Gas Appliance Manufacturers Association, natural-gas department spring meeting, Dallas, May 7-9.

Liquefied Petroleum Gas Association, annual convention and trade show, Stevens Hotel, Chicago, May 7-10.

American Petroleum Institute, Division of Production, Pacific Coast district, spring meeting, Biltmore Hotel, Los Angeles, May 10-11.

Pennsylvanian Geology and Mineral Resources of Western Indiana, fifth annual field conference, sponsored by division of geology, Indiana Department of Conservation, and department of geology, Indiana University, Bloomington, Ind., May 11-13.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

Pacific Coast Gas Association, annual transmission (technical) conference, Bakersfield, Calif., May 16-17.

American Institute of Electrical Engineers, District 5 meeting, Loraine Hotel, Madison, Wis., May 17-19.

Empire State Petroleum Association, Inc., Hotel Statler, Buffalo, N. Y., May 20-22.

American Petroleum Institute, conference on products-pipe-line technology, Biltmore Hotel, Atlanta, May 21-23.

Intermountain Association of Petroleum Geologists, second annual field conference, Canyon, House, and Confusion range areas of Millard County, Utah; headquarters, Forrest Hotel, Nephi, Utah; May 23-26.

Second annual John Zink Process Heating Seminar, John Zink Co., 4401 South Peoria, Avenue, Tulsa, May 26.

American Petroleum Institute, Division of Marketing, midyear meeting, Cincinnati, May 28-29.

Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, Division of Production, midyear meeting, Brown Palace Hotel, Denver, May 28-June 1.

Institution of Gas Engineers, London, England, May 29-June 1.

Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont., May 31-June 1.

June

Society of Automotive Engineers, Inc., summer meeting, French Lick Springs Hotel, French Lick, Ind., June 3-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, June 4.

National Oil Scouts and Landmen's Association, annual convention, Hotel Beaumont, Beaumont, Tex., June 7-9.

Rocky Mountain Oil and Gas Association, midyear meeting, Henning Hotel, Casper, Wyo., June 8-9.

Liquefied Petroleum Gas Association, Inc., first annual Mountain States district convention and trade show, Troutdale-in-the-Pines, Evergreen, Colo., June 10-12.

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Pennsylvania Grade Crude Oil Association, 1951 annual meeting, Hotel William Penn, Pittsburgh, June 14-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

Petroleum Equipment Suppliers Association, annual meeting, Chateau Frontenac, Quebec, Canada, June 17-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

Kentucky Oil and Gas Association, annual meeting, Ventura and Henry Clay hotels, Ashland, Ky., June 21-22.

American Institute of Electrical Engineers, summer general meeting, Royal York Hotel, Toronto, June 25-29.

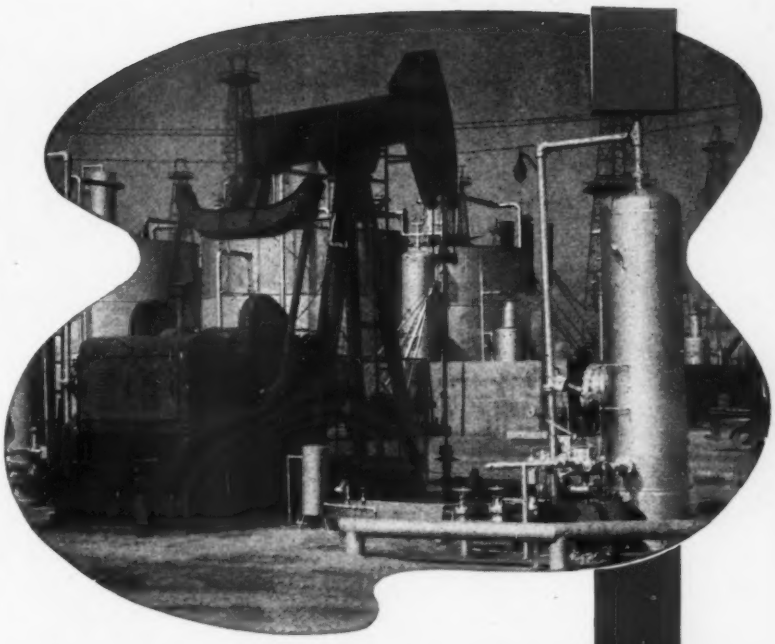
July

Wyoming Geological Association, sixth annual field conference, Rawlins, Wyo., July 31-August 3.

August

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.



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September

American Chemical Society, 120th national Diamond Jubilee meeting, Hotel Statler, New York City, September 3-7.

Pacific Coast Gas Association, annual convention, Fairmont Hotel, San Francisco, September 4-6.

Michigan Petroleum Association, annual fall convention, Ramona Park Hotel, Harbor Springs, Mich., September 6-7.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, New York City, September 8-9.

New York Oil Heating Association, Inc., Hotel Statler, New York City, September 10.

International Congress of Pure and Applied Chemistry, twelfth conference, Hotel Statler, New York City, September 10-13.

Instrument Society of America, Coliseum, Houston, September 10-14.

American Society of Mechanical Engineers, Industrial Instrument and Regulators division, Coliseum, Houston, September 10-14.

National Petroleum Association, Hotel Traymore, Atlantic City, September 12-14.

International Union of Pure and Applied Chemistry, sixteenth conference, Hotel Statler, Washington, D. C., September 14-15.

American Association of Oilwell Drilling Contractors, eleventh annual meeting, Texas Hotel, Fort Worth, September 21-23.

American Society of Mechanical Engineers, sixth petroleum mechanical-engineering conference, Mayo Hotel, Tulsa, September 24-26.

American Society of Mechanical Engineers, fall meeting, Radisson Hotel, Minneapolis, September 25-28.

October

California Natural Gasoline Association, twenty-sixth annual fall meeting, Ambassador Hotel, Los Angeles, October 4-5.

Texas Mid-Continent Oil and Gas Association, annual meeting, Hotel Beaumont, Beaumont, Tex., October 8-9.

American Oil Chemists' Society, fall meeting, Edgewater Beach Hotel, Chicago, October 8-10.

National Safety Council, thirty-ninth national safety congress and exposition, Stevens Hotel, Chicago, October 8-12.

Indiana Independent Petroleum Association, fall convention, Hotel Severin, Indianapolis, October 13-14.

Oil Progress Week, October 14-20.

American Petroleum Credit Association, twenty-seventh annual conference, Adolphus Hotel, Dallas, October 15-17.

American Gas Association, annual convention, Kiel Auditorium, St. Louis, October 15-17.

National Metal Congress and Exposition, American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, Hotels Statler, Book-Cadillac, and Detroit-Leland, Detroit, October 15-19.

American Institute of Mining and Metallurgical Engineers, petroleum branch, fall meeting, Houston, October 20-22.

Independent Petroleum Association of America, Shamrock Hotel, Houston, October 21-23.

American Institute of Electrical Engineers, fall general meeting, Hotel Cleveland, Cleveland, October 22-26.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, first Monday of each month, Louis Sherry's, 300 Park Ave.

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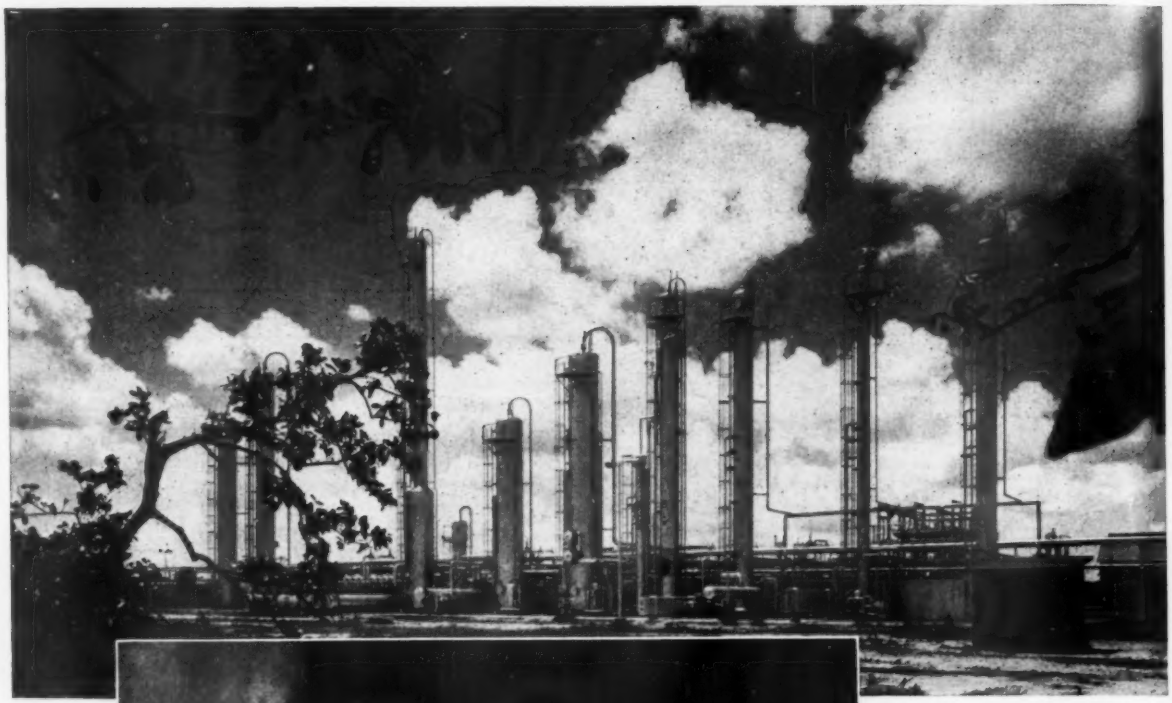

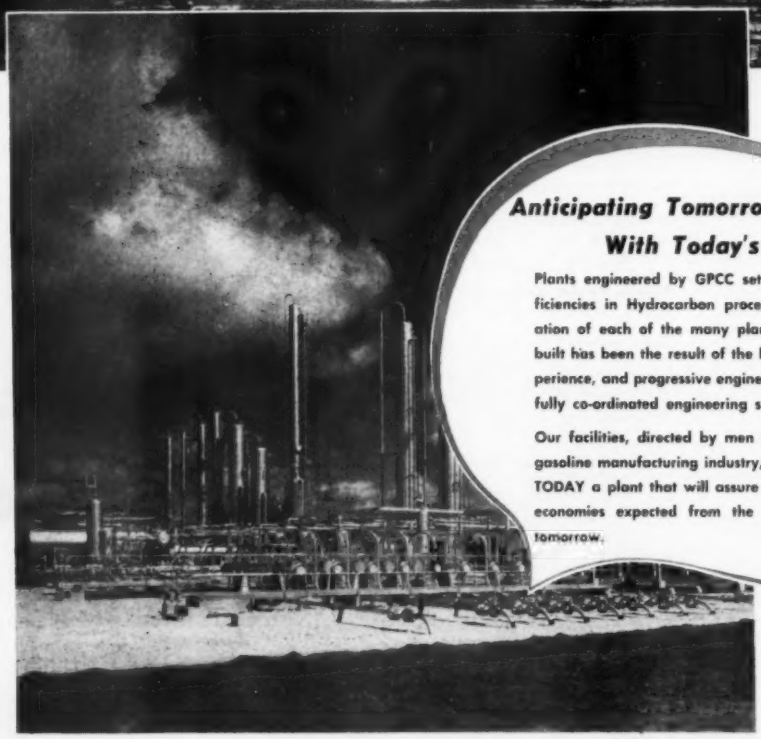

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JOURNALLY Speaking

"From the Halls of . . ."

FRIDAY the Thirteenth no longer has any terrors to Capt. Ted A. Armstrong, U. S. Marine Corps (Reserve). It was on a Friday the Thirteenth that he landed in Korea, and he could hardly be blamed for feeling that the date might be a jinx for him. He had participated in the famous Tarawa-Makin operation, and the memory of what faces Marines in such a venture was still vivid in spite of the intervening years of relative quiet on the editorial staff of The Oil and Gas Journal.

But luck was with him, for the First Marine Division was immediately assigned to the east coast and Ted was detailed to set up the headquarters company at Hungnam. He was still there when the entry of the Chinese Reds caused the Marines' famous "attack to the rear," and he assisted in evacuating the Division under fire. From then on fate was even kinder to him, and through a series of events he was ordered back to the States, then to a cozy billet in an inland Marine post, and finally to inactive reserve status.

Last week, as he was welcomed back to his old desk in our news room, Ted grinned and said: "Friday the Thirteenth again. What a coincidence. It was on a Friday the Thirteenth that I landed. . ." But we'll gladly put up with his old-warrior tales just to have him back here where he belongs.

On Display

THE oil industry will be 100 years old in 1959, and a group of Pennsylvania oil men is attempting to raise $1,000,000 to have the Drake Museum enlarged by that date. The small museum given to the Commonwealth of Pennsylvania by the American Petroleum Institute at the seventy-fifth anniversary of the Drake well in 1934 cannot accommodate the crowds which come to learn about this fascinating industry.

This public craving for information should be encouraged and satisfied by all means. In recent years the industry has assisted by installing exhibits in museums in various cities, displays at expositions, and similar devices. Outside of Pennsylvania, oil men by and large have not been much interested in history, having been too much worried about their present and future, so public collections of memorabilia are not common. But since the invention of the steam engine and the dawn of the industrial revolution probably no industry has been as misunderstood by the public as the oil industry, and if museums will correct this let's build museums all over the country.

Chocolate Depths

JOURNAL editors, past and present, have been noted for a lot of things, but never before for pulchritude. Modesty would forbid us to bring up this subject, but it has already been publicized by the Desk and Derrick Club of Houston, of which one of the three editors in our Gulf Coast office is an active and ornamental member. From the Catline, monthly organ of that worthy institution, we quote:

"A pair of brown eyes laughed their way out of the D and D Personality Hat this month. In Lucy Dee Owen's regular-featured face, they shine gaily with a natural sense of humor.

"These eyes serve more than laughter. In their chocolate depths, it does not take a perceptive observer to read sound intelligence. And the record proves the assumption. At the age of 24, Dee is an editor in name and fact on The Oil and Gas Journal. . . Considering her youth, Dee acquired an excellent background of experience before joining the staff of The Oil and Gas Journal. She served as secretary to Congressman Albert Thomas from Houston and spent 3 years with The Texas Co.

"Sophisticated, well-traveled Dee entertains her friends at the Press Club with stories of her birth in a bonafide log cabin at Athens, Tex. Of all her attributes, Dee is guilty of pride only in the possession of real pioneer blood. In her zest for living, there's pleasing rhyme to her favorite cliche, 'No pockets in shrouds.'"

Now listen, you guys. We want you to visit our Houston office on legitimate business, but don't hang around gazing into those chocolate depths. Lucy Dee has a lot of important things to do, and we don't want her distracted.

Henry D. Ralph

XUM

DOWELL SERVICE

CHEMISTRY APPLIED TO MAINTENANCE CLEANING PROBLEMS

This Refinery asked:

Can you clean open box condensers?

Dowell Service cleaned *THREE* in 10 hours!

A hard calcium carbonate and iron oxide deposit, $\frac{1}{16}$ to $\frac{1}{4}$ inch thick, had formed on the tubes of three open box condensers in a southwestern refinery. Dowell Service removed an estimated 99% of these profit-stealing deposits, *in just 10 hours.*

Before cleaning, the polymer product left the condensers at 125-140°F. After Dowell Service, the product left at 110°F. with reduced water flow through the boxes. This additional cooling resulted in a $3\frac{1}{2}\%$ to $4\frac{1}{2}\%$ increase in polymer yield. The amount of uncondensed gas was reduced by $\frac{1}{4}\%$ to $\frac{1}{2}\%$.

Dowell engineers successfully cleaned these condensers using special liquid solvents and Dowell-designed pumps and control equipment. The solvents, introduced through regular water connections, penetrated to all parts of the boxes and dissolved and disintegrated the deposits.

Call on Dowell for advice on *your* maintenance cleaning problems. Dowell Service methods are applicable to cleaning many different kinds of refinery equipment *without dismantling and with a minimum of downtime*—for example, condensers, process towers, pipe lines, storage tanks, boilers and cooling jackets. Experienced Dowell engineers will be glad to show you how they can save you real dollars in your plant maintenance program.

Other recent Dowell jobs:

Two comingler condensers in a catalytic cracki plant were cleaned without interrupting ope ation. Result: Pressure drop across units reduce from 28 lb. to 2 lb.

•

The tubes in four reactor condensers were 85% filled with a wax and oxide deposit, due t unremoved catalyst in the gas oil produc Dowell Service completely cleaned these co densers in 14 hours.

•

Heavy ferrous ferrocyanide deposits built up o the trays and caps of the bubble-cap recti column in a catalytic cracking unit. Dow Service removed this deposit in just 27 hou

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★ *Chemical services for oil, gas and water wells.*
★ *Magnesium anodes for corrosion control.*

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The OIL AND GAS JOURNAL

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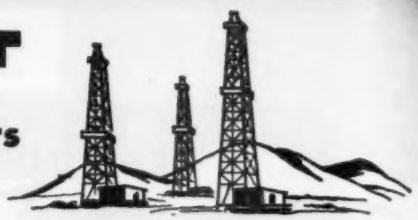
A RIG SIDE CHAT

about Baker Retainer Production Packers



What we want to talk about today is how the Baker Production Packer is set securely in the casing, anchored against either upward or downward movement, with the tubing production string left free from the packer. The tubing is run through the body of the packer for production, and is free to be pulled at any time without disturbing the packer. In the typical application drawing (far right) the packer has been set and anchored to the casing by the two sets of opposing slips, with the Hycar packing unit sealed-off against the casing and retained in position by lead seals.

We want to produce from a zone below the packer so we make up the string with a Baker Perforated Production Tube on bottom (with operator's tubing to provide an additional stinger, if desired); above is a Baker Multi-V Tubing Seal Nipple; next a No Left Turn Latching Sub; and above that comes the tubing. Now we run-in the well until the Latching Sub engages in the top of the packer. The engaged Sub automatically positions the Multi-V Tubing Seal Nipple accurately in the smooth bore of the packer, and with 5 Hycar rings facing up and 5 more facing down, a perfect seal is obtained between the tubing string and the packer bore. Meanwhile, the Perforated Production Tube, as it was run through the bore of the packer, has unseated the Flapper Valve and now holds it in open position.

It's as simple as that, and we are ready to produce through the ⅜-inch holes in the Perforated Production Tube. These holes prevent junk, debris and large pieces of shale from entering and clogging the production string; and the total area of all holes is equal to or greater than the area of the tubing string.

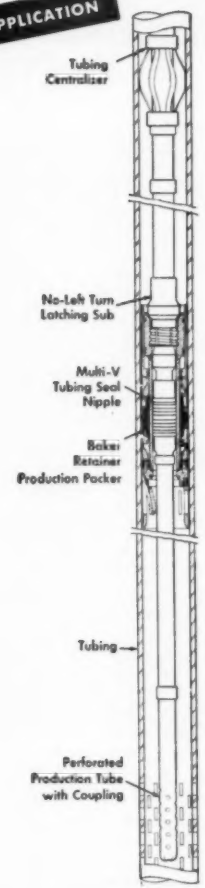
When the tubing string is pulled at some future time, the Flapper Valve in the lower end of the packer body snaps back into the closed position and maintains a fluid-tight seal against upward pressure from below. The packer is not disturbed by pulling the tubing string, but remains packed-off against the casing ready for future operations.

This is only one of the many applications of the Baker Retainer Production Packer for single-zone or multiple-zone production; for selective testing and acidizing; for protection of casing from pressure or from destructive fluids, or gases; and other profitable uses.

Baker Model "D" Retainer Production Packer Product No. 415-D

BAKER TUBING SEAL NIPPLE, MULTI-V TYPE, which effects a fluid-tight seal between the tubing string and the bore of the Packer.

TYPICAL APPLICATION



Single zone hook-up with production string anchored to packer, for: (a) keeping production string in tension to eliminate "tubing breathing" during the pumping cycle; (b) producing by flowing, without imposing excessive weight on packer to hold Tubing Seal Nipple positioned in packer bore; (c) making high pressure injection of gas or fluid for re-pressuring or secondary recovery.

Production string is run-in until No Left Turn Latching Sub rests on top of packer, indicated by drop in weight on strain gauge or weight indicator. The production string is then raised about 5 feet, and the zone washed and brought in, if it will flow.

If you would like to continue this rig-side chat at any well where you have a production packer problem, call the nearest Baker "Service Engineer." He will have helpful suggestions, and he is as near as your telephone . . .

Abilene 6820; Bakersfield 2-7487; Beaumont 4-5171; Brookhaven 1438; Casper 588-R; Coalinga 174; Corpus Christi 2-2251; Cut Bank 169; Dallas Riverside 4042; Duncan 3084; El Campo 118; Elk City 188; Falfurrias 197-W; Great Bend 5681; Harvey New Orleans Exchange, Uptown 3966; Hobbs 1040; Houma 8239; Houston Wayside 2107; Kilgore 3588; Lake Charles 6-5304; Laurel 4387; Levelland 313; Los Angeles JEfferson 8211; Magnolia 980; McAllen 2464; Natchez 181; New Orleans Magnolia 7724; Odessa 2185 or 4932; Oklahoma City 58-4445; Olney 482; Pampa 4755; Scott Lafayette 2219W; Seminole 584; Shreveport 4-1724; Snyder 837; Taft 5-2355; Tulsa 2-8083; Ventura Miller 3-3800; Victoria 314; West Branch 17; Wichita Falls 2-4776; Worland 514.

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BAKER

RETAINER PRODUCTION PACKER

PRODUCT NO. 415-D

XUM

Light Hydrocarbons

Many years ago the industry was bothered by what it called "drips", a gasoline-like liquid which condensed out of natural gas at compressor stations and at low spots in pipe lines. Getting rid of this waste was a nuisance.

From this nuisance there has developed one of the most important and fastest-growing divisions of the petroleum industry, virtually an industry of itself. For want of a generic name, the products of this division are generally referred to as light hydrocarbons, meaning natural gasoline, cycle products, and liquefied petroleum gas.

At first the drips were dumped or burned, but soon a market outlet as motor fuel led to extraction operations by compression. Further market pioneering and technology brought separation of butane and propane and their sale as bottled gas, and more recently cycling operations have become an important factor in total output.

The total output of these light hydrocarbons currently is about 9 per cent of all liquid petroleum products produced in the United States. Without this production we might have a serious oil shortage. But the importance of this branch of the industry lies not alone in the total volume of output. The most significant aspect is that most of this would have been wasted if the industry had not become interested in conservation and byproduct utilization.

When these light hydrocarbons are squeezed out of natural gas, the gas is actually improved by their removal, and gas which otherwise would be flared at oil wells finds an economic use. Producers of these products have always had an uphill fight to create new markets and build up acceptance for their products. Without this aggressive enterprise, the challenging of established markets and the development of new uses, there would be no light-hydrocarbons industry.

Here is true conservation—creating an economic demand for a bothersome waste product. It is the only practical kind of conservation. To those visionaries whose idea of conserving natural resources is to lock them up for an indefinite future, the petroleum industry has always replied that true conservation is wise utilization and that an economic incentive will do more to prevent waste than all the regulations government could devise.

During the last few years the output of light hydrocarbons has had an astonishing growth, but there is no slowing down. A big program of new plant construction is under way, distributors are engaged in an active campaign to promote new markets, and there is opening a potentially big demand for light hydrocarbons for the production of petrochemicals for myriad industrial and consumer uses.

So conservation advances hand in hand with the development of products which bring better living to more people.

XUM

THIS WEEK

PRODUCTION—New drilling to add 55 injection wells, 1,000 acres this year to highly successful North Burbank water-flood program. . . . Operators plan increase of 1,000 acres per year for next 20 years. . . . ¶Shell ends 7-year search for mysterious cause of corrosion resulting in casing failure. . . . Culprit found to be bacteria. . . . ¶Important discovery indicated by wildcat in Woodward County, Oklahoma. . . .

MATERIALS—Chaotic steel market forecast for next 6 months due to conflicting estimates and of defense planners and industry men. . . . ¶CMP effective July 1 to provide direct allotment of steel, copper, aluminum to manufacturers of oil-field equipment. . . . Goal is smooth-running machinery already operating if all-out war should come. . . . ¶NPA says considerable amounts of critical metals saved by close screening of requirements schedules of operators. . . . Prosecution threatened in flagrant cases. . . .

TRENDS—Increase in stocks of domestic crude for first week of April, calculated from production, runs, and estimates of exports and losses, was about 400,000 bbl. daily. . . . Crude inventories from Bureau of Mines weekly report for April 7 may be as much as 4,000,000 bbl. low. . . .

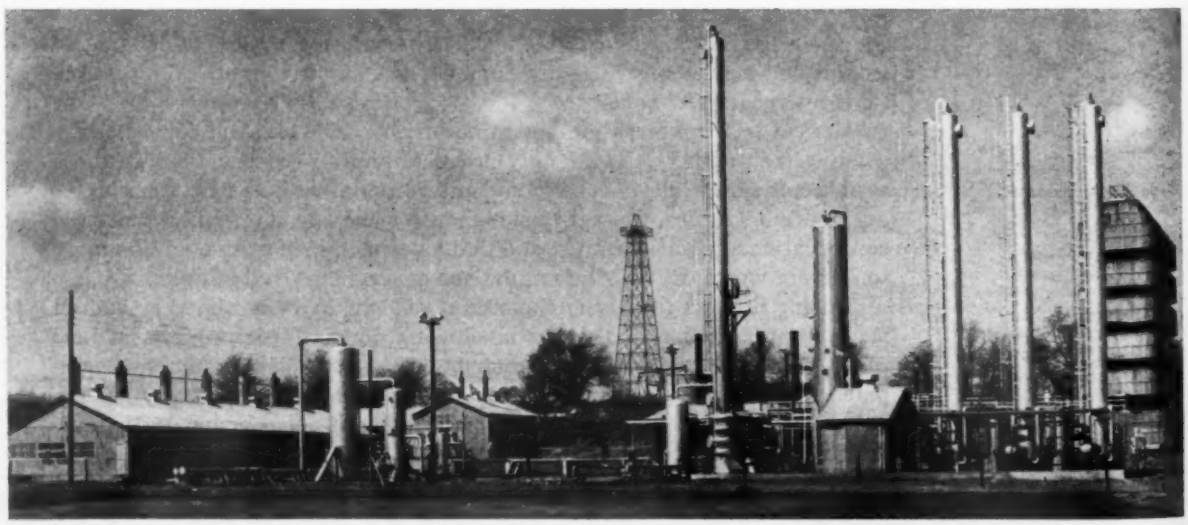
ACTIVITY—Crude production for week ended April 14 averaged 6,045,200 bbl. daily, down 11,425 bbl. daily for the week. . . . ¶Well completions totaled 761 compared with 742 for same week last year. . . . Wildcat completions decreased 8 wells for the week to 199 but increased 66 wells over same week in 1950. . . . ¶Rotary rigs operating in United States on April 9 increased 72 rigs to 2,305.

INTERNATIONAL—Partial shutdown of world's biggest refinery at Abadan forced by rioting Iranian workers. . . . Washington talks between British and United States resented in Iran. . . . New offers to government by Anglo-Iranian hinted. . . . Situation in Iraq still indefinite. . . . ¶Venezuelan junta issues decree breaking deadlock in negotiations between Creole and workers. . . . Some union requests granted in order. . . . ¶British hike gasoline tax by another 25 per cent in move to curtail consumption. . . . ¶Directional hole finds first Trinidad production under marine drilling license. . . . Production proves extension of Guapo field. . . . ¶Y.P.F. makes first oil discovery in Argentina in several years. . . .

GOVERNMENT—Texas Legislature indicates it will increase taxes on petroleum industry to boost state revenues. . . . ¶State authorities from Oklahoma, Kansas, Texas get together to form policy on export of natural gas from southwestern states. . . . Committee named to recommend conservation measures. . . .

REFINING—Esso Standard announces plans to increase capacity of Everett, Mass., refinery from 6,000 to 38,000 bbl. daily. . . . ¶Additions to include 18,500-bbl. fluid catalytic unit and 7,000-bbl. rerun pipe still. . . . ¶Pan American Petroleum announces plans for 10 per cent increase in capacity of 115,000-bbl. refinery at Texas City. . . . New units will include fluid cracking and polymerization. . . . ¶California Standard signs $25,000,000 contract to supply United Air Lines with aviation gasoline over 3-year period. . . .

NATURAL GAS—Underground storage now taking 250 billion cubic feet a year, gas-measurement short course is told. . . . C. R. Stevenson estimates one-third of expansion outlay of next 5 years will be spent for underground storage facilities. . . . ¶Southern California Gas announces plans for $36,000,000 expansion in gas-line facilities. . . .



HIGH RECOVERY.—Representative of the many plants, both large and small, built recently and planned for the future for recovery of liquid hydrocarbons from natural gas is this plant of Texas Natural Gasoline Co. in Walnut Bend field near Gainesville, Tex. This relatively small absorption plant, completed little more than a year ago, was partially constructed of equipment salvaged from a dismantled plant, and is designed to recover 70 per cent of the propane and substantially all of the heavier fractions to yield 50,000 gal. per day from 5 million cubic feet of very rich oil-well gas. A report on the current status of the natural-gasoline industry begins *on page 145 of this issue.*

Metals Allocation

Copper, steel, aluminum to be allotted directly to oil industry manufacturers under CMP; effective date July 1

Bertram F. Linz

WASHINGTON. — A controlled-materials plan under which steel, copper, and aluminum will be allotted directly to producers of oil-field machinery and all types of equipment used in the oil and gas industry will go into effect July 1.

Forms on which manufacturers will report their detailed requirements for these materials will be distributed by the National Production Authority in May. At the same time, the NPA will initiate an intensive informational program to acquaint industry with the principles and procedures of the CMP.

On the basis of manufacturers' reports and the programs submitted by the military and defense agencies, NPA will make allotments of specific amounts of the three metals starting July 1.

Two categories.—The CMP will follow the lines of the wartime regulation, with the products programed falling into two categories.

In general, products in the "A" category will be those where the most convenient method of production authorization is vertical, and producers will get their production authorizations and material allotments from their customers, the government agencies.

Products in the "B" list will be those where it is most practicable to furnish authorizations horizontally, or direct to the producer. This list, in general, will include certain civilian-type products, industrial machinery and equipment, and components which are needed for defense. Authorizations and allotments will be made by the NPA.

After the first quarter of operations, it is planned to decentralize CMP, as was done during the war, so that most manufacturers will apply to their local offices for authorizations and allotments, saving time and expense and reducing the paper work in Washington.

Tubular goods.—The special order now in effect for oil-country tubular goods (M-46), administered by the Petroleum Administration for Defense, remains in effect, and it is planned to fit it into the CMP. However, other requirements of the oil and gas industry will be handled by authorization and allotment, with PAD as the claimant agency and responsible for securing the most efficient use of the equipment provided.

PAD officials were advised some weeks ago that no orders similar to M-46 would be issued for other materials and equipment required by the industry. They already have compiled and submitted to NPA their estimates of third-quarter requirements for inclusion in the CMP.

CMP is a simple and tested plan under which NPA will tell producers what the Government has to have, furnish the timetable for getting things done, and give producers the authority to carry out the program, Administrator Manly Fleischmann explained in announcing the program. This authority is expressed in terms of an authorized-production schedule to obtain and use controlled materials and a preference rating on other materials and components needed to complete the job. The authorization of allotment of steel, copper, or aluminum will not be a hunting license, as is a priority, but "a cashier's check on the known supply."

No cure-all.—However, Fleischmann warned, "while the CMP is the best plan yet developed to assure all of us that essential production can forge ahead with minimum delay and disturbance, it is no miracle plan, no cure-all. It cannot itself increase the total supply of steel, copper, or aluminum; it cannot eliminate all hardships throughout industry. It is no substitute for the enterprise and ingenuity of the businessmen.

"Every effort will be made by NPA to get the job done with a minimum of control and to see that all business receives fair treatment. Regulations will be readied to prevent abuses, rule out hoarding of scarce materials, and provide help to small producers and service shops.

"But any program seeking to control or redirect the vast United States economy is bound to carry its quota of dislocation, temporary hardship, and the inconvenience of paper work. This will be especially true at the outset. It is the considered opinion of officials in government and those in industry who are familiar with CMP experience in World War II, however, that the advantages far outweigh any disadvantages."

Long planned. — NPA officials have had the CMP in mind from the start of the defense program last September, as the procedure to be adopted when military requirements, then relatively small and still largely unprogramed, expanded too rapidly for materials production to keep pace. The one-band priority system under which industry has been operating was a temporary expedient which officials knew, from World War II experience, would quickly break down under such conditions.

Military and supporting requirements now have reached the point where strong control of material supplies has become necessary.

Officials emphasize that CMP is not solely a machine for insuring that the armed services get everything they want. Rather, it is a means of assuring that the military get what they need but also of insuring that they do not get too much and thereby halt the production of consumer goods.

Through the wringer.—On the basis of the last war's experience, it is expected that the military and other essential programs which will be submitted may call for possibly as much as 50 per cent more than the available supply of steel, copper, and aluminum. Basically, the theory of CMP is that these programs are to be put through the wringer and the excess requirements squeezed out, what is left then being balanced against available supply.

For the time being, at least, consumer goods will not be covered by the CMP, although limitation orders will be used to spread the supply of materials. When the time comes for a decision on what consumer industries are to be deprived of supplies in order that more essential activities may continue, that decision will not be made by NPA but may be made by Defense Production Administrator William H. Harrison or Defense Mobilization Director Charles E. Wilson, or possibly may have to be made by President Truman himself.

In the last war, the Government started its materials-control effort by providing what became a multiplicity of priorities, each of which had theoretical precedence to those below it and bowed to those above. The structure toppled over from its own weight because of the liberality with which priorities were issued, which soon rendered them merely hunting licenses. The CMP plan was then adopted and, on the whole, worked quite well with the aid of a few supplemental priorities to provide needed components.

In the development of the defense program, therefore, officials saw CMP as absolutely indispensable in the event of all-out war. Since it takes considerable time to whip such a plan into shape and iron out the kinks it was decided, as a matter of prudence, to get the system set up as soon as military requirements would support it so that the machinery would be running smoothly if an emergency developed.

Amortization

DPA grants 25 permits for products facilities

WASHINGTON. — Issuance of 25 more certificates of necessity for 5-year amortization of new facilities for the production of petroleum products has been announced by the Defense Production Administration.

The oil-industry projects were among 396 facilities costing an estimated $1,310,799,000 for which DPA has issued certificates during the past month. Projects are listed below with the percentage of estimated cost granted quick amortization being shown in parentheses. They include:

Mathieson Hydrocarbon Chemical Corp., Doe Run, Ky., isobutane facilities, $19,000,000 (75); Sun Oil Co., Marcus Hook, Pa., facilities for production of benzene and toluene, $8,380,000 (85); Cities Service Oil Co., Ponca City, Okla., facilities for production of gasoline and fuel oil, $6,500,000 (75); Ashland Oil & Refining Co., St. Elmo and Wood River, Ill., facilities for production of gasoline and kerosine, $725,000 of which $665,000 was held eligible for certification (75); Western States Refining Co., North Salt Lake, Utah, facilities for gasoline, $1,413,250 of which $1,092,700 was held eligible (75); Sinclair Refining Co., Houston, facilities for normal butylenes, $27,000,000 (75).

Sun Oil Co., Delhi, La., facilities for isobutane, $238,497 (85); Frontier Natural Gasoline Co., Loco Hills, N.M., facilities for natural-gasoline production, $703,986 (75); Standard Oil Co. (Ind.), Sugar Creek, Mo., facilities for gasoline and kerosine, $21,170,000 (75); Premier Petroleum Co., Fort Worth, facilities for gasoline, $650,000 (75); Continental Oil Co., Lake Charles, La., facilities for gasoline, components, and by-products, $23,820,150 (80); Gulf Oil Corp., Port Arthur, facilities for ethylene, $15,427,000 (80).

Standard Oil Co. (Ind.), Whiting, Ind., components for aviation gasoline, $938,500 (100); Kanotex Refining Co., Arkansas City, Kans., high-octane gasoline, $2,347,423 (75); Ethyl Corp., Houston, antiknock compounds, $45,000,000 of which $44,135,000 was held eligible (85); Ethyl Corp., Baton Rouge, antiknock compounds, $4,041,000 (75); Sun Oil Co., Marcus Hook, Pa., aviation gasoline, $2,577,145 (100); Taylor Refining Co., Corpus Christi, Tex., butanes, gasoline, and oil, $5,057,493 (75).

Standard Oil Co. (Ind.), Neodesha, Kans., gasoline, $10,029,000 (80); Standard Oil Co. (Ind.), Whiting, Ind., aviation gasoline, $2,327,500 (100); Carroll B. Fulton and William H. Olmstead, San Antonio, Tex., aviation gasoline, $12,000,000 (80); Premier Petroleum Co., Fort Worth, jet fuel, butane, and gasoline, $3,580,000 (75); California Refining Co., Perth Amboy, N. J., gasoline and fuel oils, $32,950,583 (80); Phillips Petroleum Co., Borger, Tex., aviation alkylate, gasoline, and diesel oil, $15,573,700 (75); Ashland Oil & Refining Co., Canton, Ohio, gasoline, butane, and jet fuels, $3,870,000 (75).

Pipe-Order Answers

WASHINGTON. — The Petroleum Administration this week notified oil and gas operators of the action taken on their applications for priorities assistance in ordering tubular goods to be delivered during the third quarter.

The agency promised last month that such information would be made available by April 16. To make good

WATCHING WASHINGTON

Bertram F. Linz

Chaos in Steel

Industry observers predict that the next 6 months will be the most chaotic the steel market has ever experienced, due largely to differences between the "planners" in the defense organization and the industry divisions of the National Production Authority over facts and philosophies.

This confusion, however, also will be partly due to the inflated demand occasioned by the unbridled issuance of priorities; a directive by the military to its contractors to take in and store all materials they will need for production months ahead; the effort of manufacturers using steel to maintain as large an inventory as possible; and the government stockpiling program.

Where the planners and the industry men fall out is over the volume of steel to be produced this year and the extent to which its distribution should be controlled.

The planners contend the production of finished steel will be 80,000,000 tons and that 85 per cent of it will be under control in the third quarter, with 21 per cent going to military production, 34 per cent to other rated programs, and 30 per cent under the Controlled Materials Plan.

Experts from industry assert the 1951 output will be between 73,000,000 and 77,000,000 tons, and contend that it should be necessary to control only 40 to 50 per cent. If the industry men's estimate of production is right but the planners get their way, there will be very little steel for civilian production.

Stalemate in Rubber

Plans are under way by various government groups to increase the production of synthetic rubber by as much as 200,000 long tons, largely through expansion of existing facilities rather than construction of new plants, which would bring the GR-S potential close to 1,000,000 tons a year.

An increase of this magnitude has been urged by rubber manufacturers who assert that present quotas must be increased by 10,000 to 15,000 tons a month if our industrial economy is not to be affected, pointing out that already difficulty is being encountered in maintaining an adequate supply of truck tires.

The present situation is attributed in large part to the failure of the Munitions Board to build up a substantial rubber stockpile prior to the Korean outbreak and its frantic efforts to overcome that deficiency in recent months. The result, it is charged, is that the board has gone from too little to too much, and now is depriving industry of needed supplies and paving the way for collapse of the natural-rubber industry when the stockpile program is completed and buying is suddenly terminated.

The confusion created by the combination of these factors has developed sentiment for the appointment of a rubber czar, as was done during the war. Industrial production generally is running at approximately 120 per cent of the 1949 rate, but rubber-goods production has declined from a still-higher level in the third quarter of last year to about 90 per cent. Our stock position is estimated at around 840,000 tons of crude rubber, more than ample, with our synthetic output, to carry us through a 4-year war at a consumption level of 1,100,000 tons or more a year, it is declared.

Suspicion in Congress

Rep. Emanuel Celler of New York, who definitely doesn't like the spreading area dominated by "big business," is gunning for the "dollar-a-year" men in the defense organization and the unpaid members of the industry advisory committees that are assisting them.

Celler has always been suspicious of the men who serve the country without pay, believing that some of them may be using their positions to further the interests of their own companies by obtaining scarce material allocations and contract awards for them.

The congressman also is doubtful about the usefulness of the advisory committees and feels that participation in such committees may be used for the personal gain of members and their companies.

Through his monopoly-investigating committee, Celler has instituted an investigation and the committee staff has gathered a lot of information regarding the dollar-a-year men and advisory-committee members. What he will do with the data is not yet apparent but there are three courses open to him—start an all-out head hunt and hold open hearings, submit a report to the House on the situation with such comment as he sees fit to make, or drop the whole matter.

the staff of the materials division put in 12 to 14 hours a day last week working up the notifications.

Applications filed on Form PAD-17 called for tubular goods far in excess of the now anticipated available supply and were closely screened to get them down to workable figures. Even under the best of circumstances it is not expected that production of oil-country goods will reach the 157,500 tons a month rate required to carry out the well-drilling program before July. The subnormal production of the past few months has been cutting into tubular goods inventories. As a result, PAD officials do not believe that enough steel will be available to meet the third-quarter drilling programs planned by the industry as part of the drive to sink 43,400 new wells this year.

Gas Controls

Wholesaling of four gases put under OPS regulation

WASHINGTON.—Natural gas, petroleum gas, casing-head gas, and refinery gas were put under price control by the Office of Price Stabization this week through an amendment to CPR-17, issued April 10 to cover the pricing at wholesale of petroleum products *(The Oil and Gas Journal, April 12, page 57)*.

A new section (23a) was added to the regulation, effective April 16, providing the same pricing formulas for the gases as for other products but with specific additional provisions covering contracts.

OPS officials explained these were necessitated by conditions peculiar to the natural-gas industry, such as regulation by federal and state agencies, but these provisions are not expected to raise prices for gas beyond levels already foreseeable or create hardship for purchasers.

Contracts protected.—OPS explained that long-term contracts are customary in the gas industry and said these contracts will be permitted to continue in effect. Further, it said, most of the gas which will be sold under the regulation is delivered through long pipe lines, that the practice in the gas-pipe-line industry is to amortize the investment over a period of years, and such amortization is in part related to the terms of purchase contracts covering the gas supply.

Provisions.—The specific provisions for the pricing of the four gases were as follows:

"(a) Nothing in this section shall be construed to authorize the regulation of a rate that is exempt from control by the Office of Price Stabilization under the Defense Production Act of 1950.

"(b) **Specific prices.**—In cases where there were published rate schedules, or offering prices, of a seller during or within 1 year prior to the base period, then the highest of such published rates or prices shall be the ceiling prices of the seller as to the classes of purchasers to whom such rate schedules or offering prices relate in any particular market or producing area. In order for a seller to price under this section his published rates, or offering prices, shall be filed with the petroleum branch of the Office of Price Stabilization, Washington 25, D. C., on or before May 15, 1951.

"(c) **Formula prices.**—(1) Ceiling prices based on sales. In the absence of a specific price determined under paragraph (b) of this section, the ceiling price for each seller at each delivery point in a particular market or producing area shall be the highest price charged by him in such particular market or producing area during the period December 19, 1950, to January 25, 1951, inclusive, for a sale of a particular type of gas to a purchaser of the same class. In the case of sales of natural gas, petroleum gas, casing-head gas, and refinery gas, the definition of sale contained in the definitions section of this regulation shall not apply. For these products sale shall include:

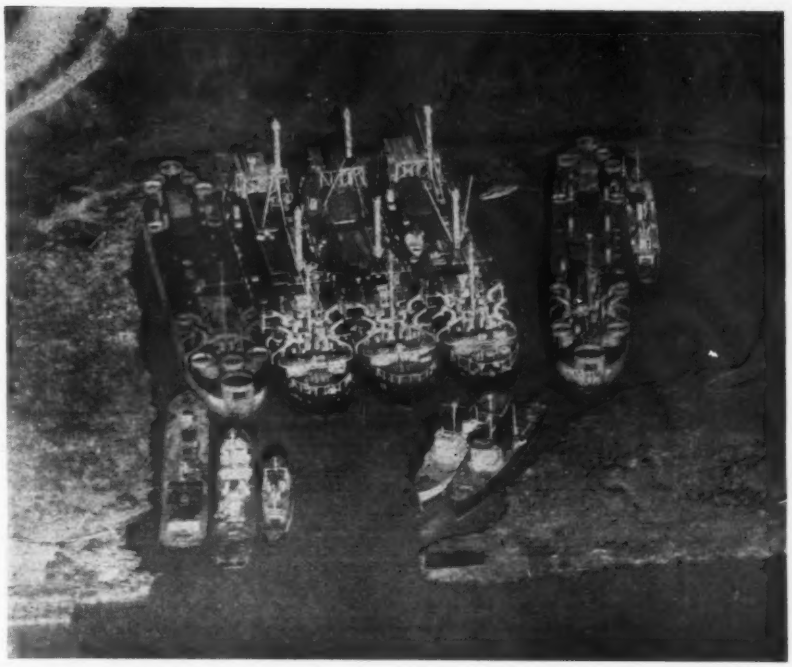
"(I) Sales in the base period pursuant to oral or written contracts, including spot sales, made during such period.

"(II) All long-term written contracts in effect in the base period can be used, in accordance with the terms of such contracts, as the basis for determining ceiling prices for all purchasers of the same class.

"(III) Written contracts made in the base period whether or not any deliveries were made thereunder, and written contracts made during the period June 1, 1950, to December 18, 1950, inclusive, under which no deliveries were made in the base period but which provided for performance to begin during or after the base period.

"(IV) Deliveries made during the base period under a written contract made prior to December 19, 1950, and after June 1, 1950, if the prices reflected current market conditions.

"(2) Existing contracts. Where a buyer and seller have entered into a contract prior to January 25, 1951, such contract may be carried out in accordance with the terms of such contract, notwithstanding any other provision of this regulation."



Tidelands Fleet at Rest

The federal Government's ban on offshore drilling has resulted in several "graveyards" along the Gulf Coast, where oil companies have tied up their offshore fleets. Shown above in storage near New Orleans are five converted tank landing ships which are used in conjunction with offshore drilling platforms. Numerous auxiliary craft can also be seen in the picture.

State Department Shuffle

WASHINGTON.—The State Department has reorganized its Bureau of Economic Affairs, abolishing the Office of International Trade Policy and setting up an Office of International Materials Policy and an Office of Economic Defense and Trade Policy as better suited to deal with international problems currently arising.

The Office of International Materials Policy is taking over the functions, personnel, and equipment of the Petroleum Policy Staff of which Edwin G. Moline has been acting chief.

The responsibilities of the office will be to insure harmony between domestic and foreign controls designed to stimulate production of basic materials in short supply; assure parallel action in the adoption of conservation measures; provide for the continued export of goods essential to meet the minimum civilian requirements of other parts of the free world; assure the availability to the United States of adequate supplies of basic materials; and promote the al-

location, where necessary, of materials in short supply.

The Office of Economic Defense and Trade Policy will work to promote the strength of the democratic nations through economic ties to prevent inflation and increase the flow of essential trade. It will also cooperate with other government agencies in developing greater political unity and assuring the long-run economic stability on which a sustained defense program must rest.

Metal Misers

NPA raises eyebrows at big programs, warns violators

WASHINGTON. — Substantial amounts of steel, aluminum, copper, rubber, and other critical materials have been saved by cancelation of inflated and duplicated orders uncovered by the National Production Authority in checking compliance with the 50-odd "M" orders thus far issued.

Currently, PAD experts are going over requirements schedules filed by oil and gas producers and also reportedly are finding many instances of "overoptimistic" drilling programs which applicants for tubular goods will be asked to explain.

NPA compliance examiners have uncovered more than 600 violations of control orders, most of them infringements of the construction and inventory-control regulations. So far, however, none has been considered sufficiently flagrant to warrant prosecution, but NPA is understood to be currently investigating several cases which may be turned over to the Department of Justice for civil or criminal prosecution. In several instances, warning letters have been sent to violators, but most cases have involved technical violations or have been the result of misunderstanding of the intent or language of regulations.

Big drive.—On the basis of results so far, NPA is preparing an intensified drive to assure compliance with its orders, including an expansion of industry surveys and spot checks, vigorous prosecution of willful violators, and extension of efforts to assist industry in conforming with regulations with a view to avoiding violations.

Federal Trade Commission investigators cooperating with NPA have completed a compliance study covering more than 300 firms in the aluminum industry and are now making a study of a similar number of producers of copper and copper-base alloy products.

In addition, NPA will soon undertake a survey of 25 concerns in each industry affected by controls. Checks on compliance are furnished by the records of manufacturers and suppliers and information from a firm's customers or competitors, the latter probably constituting the most prolific sources of complaints.

Prosecutions promised.—Any deliberate violations found by FTC or NPA surveys will be referred to the Department of Justice for "prompt and vigorous" prosecution, NPA Administrator Manly Fleishmann said in discussing the compliance program.

"While the Government desires to give all possible assistance in preventing or correcting misunderstandings of NPA controls, there should be no doubt in anyone's mind of NPA's authority and willingness to deal vigorously with the offender who puts personal gain ahead of his country's needs," Fleischmann said.

Under the provisions of the Defense Production Act, willful violation of defense-agency orders is punishable by a fine of not more than $10,000 or imprisonment for not more than 1 year, or both.

"During World War II," Fleischmann said, "in hundreds of cases administrative sanctions were applied, injunctions were used on occasion, and fines were imposed. To the credit of American industry, this group was relatively small. The same treatment of deliberate offenders can be expected now, when the threat to our national security is also great.

"Prosecutions are undertaken only after careful determination that this is the course to pursue."

Tidelands Action Expected

WASHINGTON. — A showdown on tidelands legislation is expected soon in the Senate interior affairs committee. State-rights members express confidence that they can vote down Sen. Joseph C. O'Mahoney's bill for interim federal management and send quitclaim legislation to the floor.

The committee has held two executive sessions at which representatives of the Justice, Interior, Defense, and State departments submitted their views on the two measures, apparently without changing anyone's mind.

Six weeks have elapsed since the public hearings in February without any break in the deadlock in the committee. O'Mahoney may have been playing a waiting game, hoping for some development that would provide support for his bill, but at the hearings he indicated he would not put up any vigorous fight to prevent the quitclaim bill from reaching the Senate floor. He was confident, however, a presidential veto would keep it from becoming law.

Act Extension to Be Asked

WASHINGTON. — President Truman will ask Congress within a few days to extend the Defense Production Act of 1950 and to make a number of changes in the law. He may ask for a provision which would permit the Office of Price Stabilization to grant subsidies to marginal producers of essential materials.

The question of subsidies has been in hot debate in OPS circles. One group reportedly believes that even though there is no present intention to use subsidies, the authority should be secured as "another tool in the kit" if needed; another bloc argues that if there is no intention to use a tool why carry it around?

There are indications, however, that it may be necessary soon to adopt subsidies to encourage the production from marginal mines of copper and other metals, rather than permit an across-the-board raising of the ceiling price.

Defense Orders

WASHINGTON.—The following orders have been issued by defense agencies:

Office of Price Stabilization

Interpretation 1 to the General Price Ceiling Regulation, April 9: Dealing with increases in transportation costs.

Amendment 1 to Ceiling Price Regulation 17, April 11: Including natural gas, petroleum gas, casinghead gas, and refinery gas in the products covered.

General Overriding Regulation 3, April 11: Exempting certain chemicals from price control:

National Production Authority

Schedule 2 to M-45, April 6: Placing poly tetra-fluor ethylene under complete allocation.

Amendment to M-7, April 6: Establishing a quota system to govern packers' use of aluminum closures.

Amendment to M-1, April 6: Establishing virtually complete control over the use of scarce ferro-alloys in the production of alloy iron, steel, or nonferrous products.

Amendment to M-50, April 9: Allocating 92,700,000 lb. of copper to the electric-power industry for maintenance and expansion during the second quarter.

Amendment to M-12, April 9: Exempting electric-power utilities from controls on the use of copper to the extent they are covered by M-50.

Price Set on Used Drums

WASHINGTON.—Substantial rollbacks in the prices of used steel drums are promised by the Office of Price Stabilization in a ceiling regulation now in course of preparation.

The matter has been under discussion with an industry advisory committee which reportedly is in "reasonable agreement" with the general outline of the regulation. It is expected the order, containing definite dollar-and-cents figures for reconditioning services as well as drums, will be issued shortly.

CALIFORNIA HOT SPOT.—Within 8 miles of Castaic Junction an even dozen wildcats are under way to make the area the most active in California. "A" indicates Humble Oil & Refining Co.'s ¾-mile stepout to Castaic Junction field; "B," Humble's wildcat midway between Honor Rancho and Castaic Junction fields; and "C," joint test of Humble and British American which was abandoned last week.

Watched Wildcats

East end of Santa Clara Valley holding spotlight

LOS ANGELES.—Wildcatting in the eastern end of Santa Clara Valley, in the general vicinity of Newhall and Castaic about 35 miles northwest of here, continues to steal the spotlight from other California regions—including Cuyama Valley.

During recent weeks a ¾-mile eastern extension was given the Castaic Junction field. This year-old field is proving to be one of the most important developments in California of the past year. It has only four wells, two in a 11,000-ft. sand and two in a 10,000-ft. pay, but they extend in a line almost 2 miles in length.

In addition, a new Pliocene sand pool was opened on the southeast edge of Newhall. The discovery, in a 3,100-ft. sand, was not too impressive and currently is pumping about 35 bbl. daily.

Within a radius of about 8 miles of Castaic Junction and close by Honor Rancho, which also was a 1950 discovery, an even dozen wildcats or extension attempts are under way. Of these possibly the most closely watched is that of General Exploration Co. in Section 29-4n-16w, about 1½ miles southeast of Castaic Junction field. Currently drilling below 3,600 ft., it is searching for the deep pays opened by Humble's wells.

Humble and British American last week abandoned their joint test ½ mile west of Honor Rancho. It found water in both the 5,300 and 6,400-ft. sands which produce in Honor Rancho and failed to find anything of interest in going to 11,440 ft. Between Honor Rancho and Castaic Junction, Humble carried its No. 1-B Newhall Land to 12,744 ft. then plugged back and is now redrilling in a deviated hole at 4,400 ft.

Mud-Bug Problem

Shell finds bacteria causing casing corrosion at Ventura

D. H. Stormont

VENTURA, Calif. — The Ventura Avenue field here, already renowned for its unusually thick sand sections and difficult drilling problems, has come up with still another unusual situation. This time it is casing corrosion caused by the activity of anaerobic sulfate-reducing bacteria at depths from 900 to below 7,000 ft.

In the 7-year period since the first leak occurred, a total of 75 or 80 well casings are thought to have failed because of corrosion. During this time engineers and laboratory personnel of Shell Oil Co. and Shell Development Co. continually sought to determine the cause. Now that they have found it, it is thought very likely that bacterial corrosion also is present in other nearby fields.

Cause and prevention.—The bacteria are believed to have been introduced into Shell's Ventura wells through being present in the low pH mud which was used in drilling the holes. Formation samples failed to reveal their presence in any strata where corrosion was found. They were found to exist in the central mud pit.

Through adopting use of high pH muds, which have been found to definitely inhibit bacterial growth, the problem is believed to be solved insofar as recently drilled and future wells are concerned. That of what to do with the 250 wells drilled with low pH muds (about 8.5) between 1938 and 1950 has not been answered. Unless some preventive measure is devised, it has been predicted that the casing in about 75 per cent of these wells may fail.

How they found it.—Plagued by the large number of casing leaks, Shell first tried cathodic protection, insulating flanges on well-head connections, protective coatings, and extra casing strings.

As there was some evidence that salt water could be migrating behind the well casings, a full-string cementing job was performed on 19 wells. In all this work, between 1943 and about a year ago, the actual cause of corrosion could not be determined.

The turning point came when the 7-in. corroded casing was pulled from a well and subjected to intensive analysis. Also, samples of the formation adjacent to the leak at 2,395 ft., scale in the corroded areas, the mud cake adhering to the casing, and the drilling fluid used to wash over the casing were taken.

Results of an analysis of the scale obtained from the pitted casing near the leak showed that the constituents of the scale were strikingly similar to those reported in cases where sufate-reducing bacteria were known to be the cause of corrosion on pipe lines. Further study led Shell engineers to the conclusion that these bacteria were responsible.

Water-Flood Success

North Burbank pilot project boosts recovery from 37 to 877 bbl. per day; 20-year, 20,000-acre program started

Kenneth B. Barnes

SHIDLER, Okla. — Outstanding results have been obtained from the 160-acre pilot water-flood project in the North Burbank field unit and the operators have announced that they are in the process of placing 55 water-injection wells in operation. This new program will add 1,000 acres surrounding the original 160-acre pilot flood area.

Production from the pilot flood averaged 877 bbl. per day during January, in comparison with the relative dribble of 37 bbl. per day from the 160-acre stripper lease before water-drive operations were effective.

In the 1,000-acre addition water has already been turned into two of the new injection wells. Five of the injection wells will be newly drilled, 50 will be converted from present producers, and 6 more producing wells will be drilled.

Pilot water drive.—The initial water flood was installed in the 160 acres comprising the SW¼ 16-26n-6e, in the center of the southern part of the 22,000-acre field (see map).

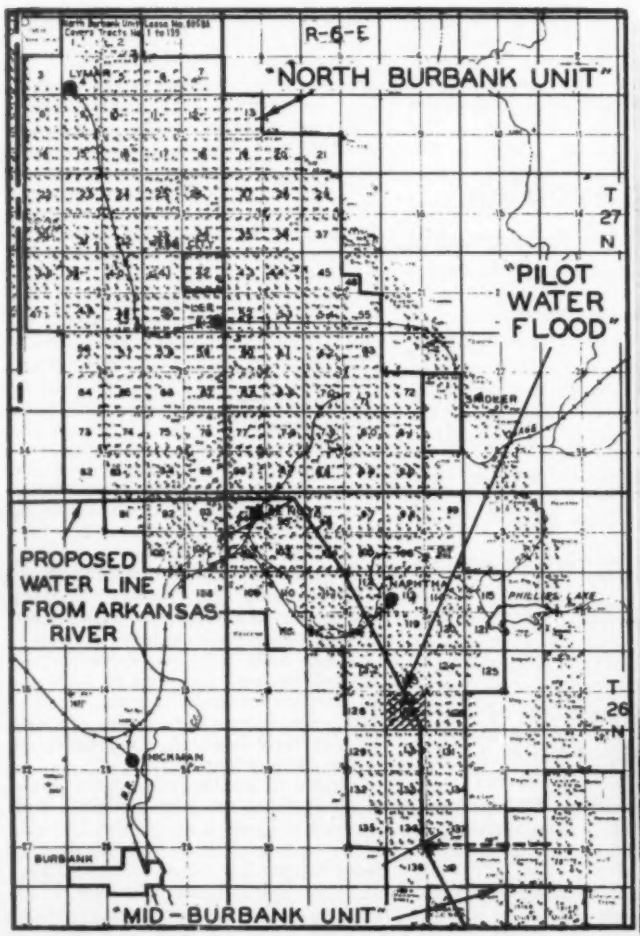
North Burbank, discovered in 1920, produces from the Pennsylvanian "Burbank" sand at a depth of 2,900 ft. There has been a recovery of 169,000,000 bbl. of oil. The producing sand thickness runs mostly from about 40 to a maximum of 100 ft.

Water injection to the pilot flood was commenced February 25, 1950. Accumulative water input to date has been 2,500,000 bbl. Current rate of injection is 10,000 bbl. per day. Since the project started 15 of 16 wells in the pilot area have responded to the artificial water drive.

No precedent.—The entire North Burbank field was unitized in preparation for the water-drive operation. Operator is Phillips Petroleum Co. Fourteen corporations and six individual operators are represented in the unit lease. This first addition is the beginning of a schedule to add 1,000 acres of new water-flood development each year for 20 years, ultimately providing water drive for the entire North Burbank unit.

The development of an active pattern-type water flood of 1,000 acres at 2,900 ft. in 1 year's time is without precedent in the Mid-Continent fields, and the work will be the largest undertaking of its kind in secondary recovery in this area.

Big inch water supply line.—An even



Left: Map of North Burbank unit showing location of pilot water flood. Right: Rotary rig being skidded to a new location in the 1,000-acre area being added to the original 160-acre pilot flood area.

more important phase of the entire project is expected to begin soon. A 14-mile water line of 30 and 24-in. pipe from the Arkansas River to the Burbank pool will be built by operators in the North Burbank Unit, Mid-Continent Unit, South Burbank Unit, and by operators in the Fairfax pool. The line will furnish water for all flooding operations in the area and will have a peak capacity of 300,000 bbl. a day.

River gages have proved that the effects of removing the 300,000 bbl. of water daily from the river will be negligible. Instead of pumping directly from the river, wells will be drilled on the bank of the river to drain water from the sand and gravel alongside the river bed, where there is more water than in the stream itself.

Some of the big inch pipe is now on hand. However, operators of the water-flood project believe problems may arise in the future because of handicaps caused by the steel shortage.

Arkansas Oil Tax Proposed

LITTLE ROCK, Ark.—The Arkansas Legislature has been recalled into special session by Governor McMath, and a bill has been introduced to increase the severance tax on crude oil and natural gas.

It was only March 8 that the group adjourned. During the regular session no new tax levies were made on the oil and gas industry. Several bills of interest to the industry were passed, however. One set up regulations for the unitizing of oil and gas fields and another was a standard gas measurement law.

In the governor's call for the special session, he set forth a 10-point program. All 10 points call for more appropriations which in turn will require further taxes.

There are indications that an increased sales tax and beer tax will provide the additional revenue. However, House Bill 20 calls for a severance tax of 3/10 of 1 cent per 1,000 cu. ft. on natural gas and 5 per cent of market value on crude oil.

Oklahoma Discovery

An oil discovery of possible major significance appears to have been made in Woodward County, on the northward trend of the Anadarko Basin, in northwestern Oklahoma, where a rank wildcat, drilled by Sinclair Oil & Gas Co. as unit operator flowed at an estimated rate of 10 bbl. per hour of 44° gravity oil in a drill-stem test of a deep pay zone identified either as Viola lime or Simpson dolomite.

The prospective producer, designated as 1 O. Z. Morrow Community, is located in the C SE SE 6-23n-19w, about 7 miles northeast of Woodward, the county seat. If commercial production is established it will be the first for the county. Nearest production of any consequence is in Ringwood field, Major County, approximately 50 miles to the southeast.

The test making the flow was of a zone at 9,679-9,715 ft. With tester open 46 minutes, gas flowed in 11 minutes and oil in 46 minutes. A previous test was made of an interval at 9,652-72 ft., in which 120 ft. of oil and gas-cut mud was recovered with tool open 60 minutes. Operators are drilling ahead to contract depth of 10,000 ft.

Associated with Sinclair in the unitized effort are Carter Oil Co., Champlin Refining Co., Devonian Oil Co., H. L. Hunt, Magnolia Petroleum Co., Mid-Continent Petroleum Corp., and Pure Oil Co.

MEETINGS

A.P.I. Program Readied

Technical papers concerning spectrographic analysis will predominate at the sixteenth midyear meeting of the American Petroleum Institute's Division of Refining at the Mayo Hotel in Tulsa April 30-May 3.

Among papers to be presented April 30 are:

"The Quenched Electrode Procedure in Spectrographic Analysis—A Report of the A.P.I. Subcommittee on Emission Spectroscopy," Ralph O. Clark and others, Gulf Research & Development Co.; "Characteristics of the Spectrographic-Arc Emission of Metal Contaminants in Cracking Catalyst," E. L. Gunn, Humble Oil & Refining Co.; "Spectroscopic Determination of Vanadium in Residual Fuel Oils," J. W. Anderson and H. K. Hughes, Socony-Vacuum Laboratories.

"Determination of Iron in Used Lubricating Oils by Spectrochemical analysis," John Hansen, Paul Skiba, and C. R. Hodgkins, Standard Oil Development Co.; "Spectrographic Analysis of New and Used Lubricating Oils," C. M. Gambrill, A. G. Gassmann, and W. R. O'Neill, Ethyl Corp.; "Testing Used Lubricating Oils for Normal Pentane and Benzene Insolubles," J. S. Wiberley, R. K. Siegfriedt, and L. J. DiPaola, Socony-Vacuum Laboratories.

"The Determination of Oil in Refinery Waste Waters—A Benzene Extraction-Semi-Micro Method," A. F. S. Musante, Sun Oil Co.; "An Ultraviolet Method for the Determination of Total Alkyl Benzenes in Selected Crude Fractions," John F. Kinder, Sinclair Refining Co.; "Direct Determination of Oxygen in Organic Compounds by an Unterzaucher-Manometric Method," Joseph Halowchak and G. E. C. Wear, Standard Oil Development Co.; "Determination of Oxygen in Organic Material," Morris Dundy and Ervin Sterh, The Texas Co.

"The Polarographic Determination of Dissolved Oxygen in Petroleum Fractions," Maynard E. Hall, Humble Oil & Refining Co.; "Formation of Engine-Deposit Compounds by Solid-State Reactions," Frances W. Lamb and Leonard M. Niebylski, Ethyl Corp.; "Infrared Spectrophotometric Determination of Oils and Phenols in Water," R. G. Simard, I. Hasegawa, W. Bandaruk, and C. E. Headington, Atlantic Refining Co.; "The Infrared Spectra and Structures of Paraffins, Olefins, and Alkyl Aromatics; Modern Analytical Distillation of Crude Petroleum," J. A. Lockwood, R. L. LeTourneau, Robert Matteson, and Frank Sipos, California Research Corp.

3,500 to Attend Sessions

ST. LOUIS. — Approximately 3,500 exploration scientists are expected to attend the annual joint meeting here April 23-26 of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists.

Papers of general interest, concluding with an informal discussion on the possibility of forming a mining-geophysics section will feature activities of the opening day.

Tuesday will feature a joint session of all three groups, at which Max Steineke, Arabian American Oil Co., San Francisco, will be presented the A.A.P.G.'s Sidney Powers Memorial Medal, and A.A.P.G. and S.E.G. will present best-paper awards. Tuesday evening L. G. Weeks will present his A.A.P.G.-sponsored distinguished lecture, "Sedimentary Basin Development and Its Effect on Oil Occurrence."

Wednesday begins A.A.P.G.'s symposium on oil and gas reservoirs. S.E.P.M. will have papers on paleontology and components of sedimentary rocks. Papers on gravity, magnetics, and seismic research and interpretation will be included in S.E.G.'s program for the day.

On Thursday A.A.P.G. will have general and foreign papers, S.E.P.M.'s papers will be on the paleoecology of shale and evaporites, while S.E.G. will make an excursion to the St. Louis University Institute of Technology and the Florissant geophysical field station.

N.G.A.A. Program Set

Materials orders and priority procedures of the Petroleum Administration for Defense and their effect on the natural-gasoline industry will be discussed at the thirteenth annual convention of the Natural Gasoline Association of America in Tulsa April 25-27.

Convening at the Mayo Hotel, the group will hear Charles E. Webber, chief of the materials branch of the natural-gasoline and natural-gas division of PAD, discuss the various orders. This discussion will be followed by a question-and-answer period on current industry needs, led by Webber.

Technical papers to be presented include:

"Centrifugal Compressors in Operation at the Seeligson Plant," by Dan T. McDonald, Magnolia Petroleum Corp., Dallas; "Underground Storage of Liquefied Petroleum Gases," by Frank Matheny, Sid Richardson Gasoline Co., Fort Worth; "Promotion of L.P.-Gas Sales," by E. Carl Sorby, George D. Roper Corp., Rockford, Ill.; "Gas Hydrate Formation With Brine and Ethanol Solutions," Dr. D. L. Katz, University of Michigan, Ann Arbor.

"The Role of Natural Gasoline in Better Fuels for Better Engines," L. A. McReynolds and T. W. Legatski, Phillips Petroleum Co., Bartlesville, Okla.; and "Processing of Gas-Distillate Raw Materials," by C. R. Williams, president, Pacific Northwest Pipe Line Co., Houston.

Gas-Storage Growth

It's going underground at a rate of 250 billion cubic feet per year, gas-measurement short course is told

Joseph A. Kornfeld

NORMAN, Okla. — The natural-gas industry in the United States will spend about a billion dollars during the next 5 years for additional underground-storage facilities. This will constitute one-third of the industry's total expansion outlay.

This statement by C. R. Stevenson, gas-measurement engineer, Michigan-Wisconsin Pipe Line Co., Detroit, was made in a technical address before the twenty-sixth annual Southwestern Gas Measurement Short Course held here last week.

Stevenson's address was a highlight of the 80 technical papers on the subjects of gas measurement, regulation, instrumentation, and accounting presented to a record enrollment of 942 registrants from 34 states and 5 foreign countries.

Storage growth.—The Detroit engineer traced the growth of underground storage, noting that while 70 billion cubic feet was injected during 1945, the figure had risen to 250 billion cubic feet in 1950. He said the pressuring of old oil and gas fields offers more capacity than other forms of storage and affords the lowest economic storage cost.

Reservoir selection.—Stevenson called attention to field experiments in underground storage by several companies not now owning depleted oil or gas fields. These field studies are being conducted with water-filled sands having good structural features for potential storage reservoirs. He predicted that if such sands prove feasible for the storage of gas a number of companies will adopt the same practice during the next few years. Some attention is being given to the storage of gas in porous limestones.

Michigan-Wisconsin operates three underground natural-gas-storage reservoirs in Michigan with a combined capacity of 28 billion cubic feet above the "cushion" and plans storage conversion in Lincoln-Freeman field.

The engineer called attention to the fact that the great distances between the gas fields and the ultimate consumers has made underground storage one of the best means of balancing supply and demand. Underground storage, he said, enables the operator to meet large peak loads, occasional emergencies, and to maintain a high load factor on the transmission system. To meet these demands, transmission systems should be maintained as nearly as possible at a 100 per cent load factor throughout the year. This practice would tend toward obtaining a lower price on purchase gas contracts. The avoidance of variable take from producing wells would prolong the life and deliverability of some gas fields.

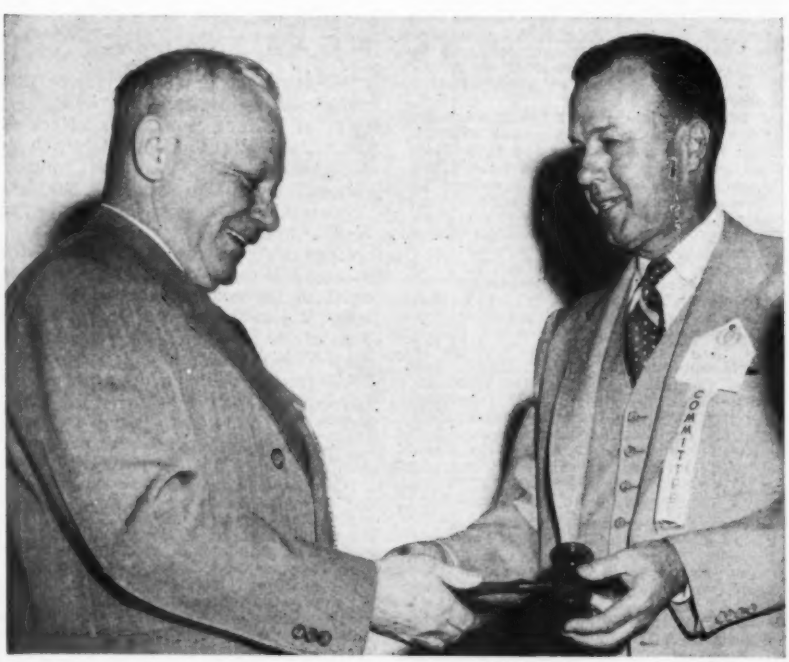
Observation wells.—Engineeringwise, some storage-field operators designate certain wells as observation points which are not used for injection or withdrawal. These wells are used to furnish pressure data from which a volume per pound index can be established for the field. Over a period of time, this index will indicate whether a field is operating efficiently. Observation wells must be strategically located so that the pressures observed on them are representative of the respective areas of the storage reservoir.

Metering problems.—The reversal of flow and changes in demand were termed by Stevenson as "the worst headaches" for the storage-measurement engineer, especially at the beginning and end of the injection season. He recommended that at least two meter runs be installed on each storage to expedite measurement under various load conditions. The meter station should be sized to handle the maximum and minimum volumes which are intended to be injected or withdrawn from each field.

He called attention to the necessity of protecting the storage sands against the compressor oil. Adequate scrubber facilities for cleaning the gas should be installed on the discharge side of the compressor stations on lines feeding the storage fields.

Lift gas.—Dan T. McDonald, Jr., Magnolia Petroleum Co., Dallas, noted that gas-lift operations are becoming more widespread in the United States. The accurate measurement of the gas used for lifting oil is a major problem from engineering, operating, and conservation angles.

"With booming natural-gas markets, enlightened conservation practices, higher operating cost, and scarcity of 'free' gas supplies, the prudent operator has been working toward greater accuracy in lift-gas measurements. Sales economics, compression and process facility design, regulatory bodies, and all-around good operating practice demand this accuracy," he said.



James L. Griffin, left, superintendent of Northern Natural Gas Co., Omaha, Neb., receives the chairman's gavel after his election at the Gas Measurement Short Course to succeed Ben F. Worley, right, superintendent of distribution of the Louisiana-Mississippi division of United Gas Corp. Griffin was 1951 program chairman. Worley becomes a member of the short-course executive committee. The 1952 short course will be held next April 8-10.

The Magnolia engineer discussed the following methods to attain greater interpretation and measurement accuracy when dealing with lift gas: fast clocks, assumption of constant cycle, integrating meters, intermittent clock operation, choked flow, dual settings, and positive-displacement meters.

Wet-gas metering.—E. P. Prater, Arkansas-Louisiana Gas Co., Shreveport, in discussing "Field Measurement at Extremely High Pressures" stated that the metering of wet gas at its source is more of a problem than metering at gasoline plants, dehydration plants, and check-meter stations because of the difficulty in maintaining meters. These conditions are usually attributed to freezing in the gage lines and meters, emulsified mercury due to entrapment of liquid in the manometer body of the meter, and binding and sticking of the pressure tight bearing.

M. A. ABERNATHY
Honored at dinner.

To eliminate these difficulties, he explained, house heaters and all-welded manifolds are used to reduce freezing. A new synthetic packing for pressure tight differential bearing shafts has been proven effective under very high pressures. The use of this greaseless bearing has virtually eliminated the troubles formerly encountered with the older types requiring frequent replacement of lubricant to stop leakage and binding. Some recently improved models of mercuryless meters may also prove invaluable in wet-gas measurement.

New committee.—W. A. Griffin, vice president, Daniel Orifice Fitting Co., Houston, was named chairman of the exhibits-advisory committee, a new committee which was created this year in recognition of the value of exhibitors displaying educational material. Other members named are: Ken Wolfe, vice president, Fisher Governor Co., Marshalltown, Iowa; William Chandler, Refinery Supply Co., Tulsa; Paul E. Bowles, Climax Controls Division, Black, Sivalls & Bryson, Tulsa; and W. O. Moran, Moran Furnace & Sheet Metal Co., Tulsa. The five-man committee will serve for a 1-year term.

Members of the executive committee honored M. A. Abernathy, Houston, at a dinner held by the general committee on the eve of the short course. Abernathy, who has had more than 31 years of experience in natural gas and petroleum industries, is a vice president of United Gas Corp. and a director of Union Producing Co.

Saving Wire Rope

Lubrication in the field needed, A.S.L.E. is told

PHILADELPHIA.—Utilization of lubricants formed the central theme of the 16 technical papers presented here during the 3-day national convention of the American Society of Lubrication Engineers.

One paper of particular interest to the petroleum industry, from the standpoint of both supplier and user, was that on lubrication of wire rope by John P. Critchlow, chief fuels and lubricants engineer, rolling-mill section, Gulf Oil Corp., Pittsburgh, and Roland W. Flynn, staff engineer, Gulf Oil Corp., New York.

The two Gulf engineers told the group that the most important phase of wire-rope lubrication is at the point of manufacture.

"Many wire ropes get no further lubrication," they said. "In some cases it is not necessary. For most wire-rope applications, however, it is decidedly necessary, but due to a lack of knowledge of the importance of relubrication or a lack of suitable relubricating facilities, many wire ropes in the field are neglected."

The authors said the best relubricant for wire rope is the same as that used when it was manufactured. To be effective, it should be heated to a sufficient temperature to penetrate to the core.

"Lubricants, such as used on the rope when it is manufactured, and diluted with a suitable volatile solvent can be applied in the field, without heating, either by dripping continually as the rope passes over a sheave, for instance, or by brushing," they said.

The authors pointed out that the petroleum industry ranks next behind the steel industry as the largest user of wire rope. They discussed the qualifications of a satisfactory wire-rope lubricant and presented results of a series of breaking-strength tests showing that the number of pulsating loads to failure on a ⅞-in., 45,600-lb. breaking-strength wire rope was 4,907,375 when fully lubricated and 564,400 on a rope not lubricated.

Wildcat Oil Sold

An agreement has been entered into by Amerada Petroleum Corp. and Northwestern Refining Co., of St. Paul Park, Minn., covering the purchase of oil from the company's wildcat discovery in North Dakota. *(See The Oil and Gas Journal, April 12, pages 69 and 137).*

Amerada will transport crude oil by truck from its well in Williams County in the northwestern part of North Dakota to Tioga, a distance of 8 miles. Tioga is a small town on the Northern Pacific Railroad. From that point, the crude oil will move by tank car to Northwestern's refinery at St. Paul Park on the Mississippi River, adjoining St. Paul, Minn. The refinery has a capacity of 3,000 bbl. daily. Northwestern also operates a 5,000-bbl. plant at New Brighton, Minn. It buys its crude from sources in the Southwest and Rocky Mountain areas.

It is understood the new arrangement covers a temporary period which will enable Amerada to make a thorough test of the producing possibilities of the discovery. Tests have indicated the crude will have a gravity in excess of 50° A.P.I. and also has sulfur properties which will be reflected in the refining and treating operations.

Henry Waters, in charge of crude-oil purchases for the Northwestern company with headquarters in Tulsa, negotiated the agreement with Amerada. Waters is a former vice president of Stanolind Crude Oil Purchasing Co.

Additional word on the capabilities of Amerada's discovery, which flowed 307 bbl. of 50°-gravity oil and an estimated 6,000,000 cu. ft. of gas in 17 hours through a ¾-in. choke, this week was still eagerly awaited. Amerada is now rerunning tubing after experiencing considerable difficulty killing the well in order to pull and replace a split section of tubing.

Waste-Gas Sulfur

Plans for construction of two new-type sulfur plants to extract sulfur from waste gases were announced within the oil industry last week.

The announcements followed by a week an appeal to the industry by Reid Brazell, director of the refining division of the Petroleum Administration for Defense, to remove sulfur from refinery gases to help augment the dwindling supplies of this basic chemical.

ODESSA, Tex.—Odessa Natural Gasoline Co. and Sid Richardson Carbon Co. will build the first Texas plant for recovery of crude sulfur from waste gases at casinghead gasoline plants. The $200,000 initial facility is to be built adjacent to the Odessa gasoline plant located just northwest of the city.

Recovery is estimated at 20 long tons a day from the estimated 25 tons of sulfur now being burned as waste.

BATON ROUGE. — A sulfur-recovery plant is to be built adjoining the south property line of Esso Standard Oil Co. refinery here by Consolidated Chemical Industries, Inc.

W. J. Daspit of Consolidated says that anticipated recovery of sulfur from refinery gases will amount to 30 tons daily.

Construction is to begin as soon as materials are available. Ralph M. Parsons of Los Angeles is chief contractor and plant designer.

"Dog and Pony" Finale

PAD officials wind up educate-the-industry tour with appearance in New York; foreign division is explained

Dahl M. Duff

NEW YORK. — A capacity turnout of more than 300 crowded a Commodore Hotel ballroom April 13 to hear five officials of the Petroleum Administration for Defense explain what will be required of the industry in the defense mobilization.

The discussions here were the last of a series of five meetings conducted across the country in what Al Frame, assistant deputy administrator, called PAD's "dog and pony" show. The purpose was to bring the story of the oil-defense effort to the industry.

Foreign setup. — Only departure in the New York meetings was the brief discussion of PAD's foreign division given by George Ballou, director of the foreign refining division.

Special guests at the New York meeting were the five top officials of Canada's oil-defense organization: O. B. Hopkins, director of the Petroleum Division of the Department of Defense Production, D. M. Morrison, head of the refining section, Ralph Wills, production, H. E. Saunders, materials, and G. S. Hanna, supply and transportation.

Ballou said PAD's foreign division will be along the lines of the old PAW setup when its organization is complete. There will be three divisions: refining, production, and supply and transportation, all an integral part of the PAD team. He said the division would work closely with other government agencies involved in international relations, and with officials dealing with oil in the foreign governments themselves.

Demand.—William P. Hayes, assistant director of PAD's supply and transportation division, told the group that 1951 demand for all oil products is estimated at 10 per cent over 1950. This will require a 12.3 increase in domestic crude production with a 1951 average of 6,065,000 bbl. daily. Crude and residual stocks he said are low, and the balance between supply and demand was very close in some areas last winter.

Transportation.—He said PAD is investigating the possibility of moving propane through existing products lines. The tank-car situation, he said, should ease in coming months, but many of them will be required for aviation-gasoline shipments. In 1950, the industry added a record of 58,000,000 bbl. in new tankage. In 1951, he said, the industry would like to add another 80,000,000 bbl. were steel available. He said the time is short, but that storage must be added, especially at frozen terminals.

Frank Watts of PAD tells members of Petroleum Equipment Suppliers Association in Los Angeles what is in store as regards oilfield materials. Watts, on tour with PAD's "traveling circus," made the talk during the group's West Coast swing. At left is Ted Sutter, association president.

Materials. — The materials situation was reviewed by H. R. Hansen, assistant director of the materials division, who said the industry can make its 43,400-wells-drilled goal this year by using inventories, imports, used tubular goods, and "getting the greatest possible footage per ton of material." An analysis of PAD Form 17's returned indicated that the industry would drill from 72,000 to 75,000 wells if materials were provided.

The next 15 or 16 months will continue to be critical for the industry insofar as the supply of materials is concerned. The pressure should be slightly less in the third quarter, Hansen said, or at least by that time, the situation should "cease to worsen."

Refining.—Thomas L. Apjohn, assistant director for refining, said rehabilitation of old alkylation plants costs from $100,000 to $1,000,000 each and that the legal procedure to enable refiners to carry this out, financially, is under discussion. He said the short-term supply position for aviation gasoline is good, but the long-term picture is "not so good." He described proposed changes in specifications for jet fuel and said it can be expected that even more restrictive specifications will be set up later.

The situation regarding TEL was outlined by Reid Brazell, PAD's refining director. He said the reserve supply of lead fluid will be built up and the remainder will be distributed as equitably as possible. New TEL production facilities will not be ready until 1951, and even then it is a question whether sufficient raw materials will be available for them. PAD is now mainly concerned with maintaining the level of present production.

Industry Briefs

WASHINGTON.—Harry E. Humphreys, president of United States Rubber Co., told a Senate subcommittee last week the nation's natural and synthetic rubber supply is sufficient to see the nation through a 5-year war without imports. He recommended that controls be lifted and the industry returned to the men "who know rubber—who know how to grow it, make it, process it, and distribute it."

CHICAGO.—Standard Oil Co. (Ind.) and 10 subsidiaries last week announced distribution of nearly $2,000,000 worth of Standard stock to more than 25,000 employes at the end of the first year of the company's employe-savings and stock-bonus plan. To qualify for the bonus, employes had to be in the company's retirement plan and also had to authorize payroll deductions for the purchase of U. S. savings bonds.

CALGARY, Canada.—Shell Oil Co. has announced plans for construction of southern Alberta's first sulfur plant to be built at Jumping Pound, 20 miles west of here. The plant will cost $500,000 and will produce about 10,000 tons of elemental sulfur annually. Contract has not yet been awarded.

MAGNOLIA, Ark.—The McKamie Gas Cleaning Co. plant resumed operation this week after a 5-month shutdown to double its capacity. The plant is now capable of producing 30,000 gal. of gasoline and 31,000 gal. of butane and isobutane daily. It also will produce about 150 tons of sulfur daily in one of the largest sulfur-gas cleaning operations in the nation.

GULF COAST

Water-Flood Plan Approved

SHREVEPORT.—Midstates Oil Corp., as the operator, has been granted permission by the state department of conservation to conduct a water-flood secondary-recovery program in the old Lisbon field of Claiborne and Lincoln parishes, North Louisiana.

The unit will cover approximately 10,000 acres of land on which there are 44 wells. This area, producing from the Pettit limestone, has produced approximately 11,000,000 bbl. of oil. It has been estimated that water injection will make possible an ultimate yield of nearly twice that amount.

SOUTHWEST

Texas Taxes

Oil industry again to be hit up for added revenue

AUSTIN.—The Texas Legislature is continuing its efforts to raise more money for government expenses and it is almost certain that the state's largest taxpayer, the oil and gas industry, will be hit again for much of the additional revenue.

The House of Representatives is expected this week to pass a bill which makes permanent a 10 per cent increase in the tax on items in the omnibus tax schedule. Oil and gas, through a severance tax, provide the major part of the revenue derived from the omnibus tax law. The 10 per cent increase in rates was placed on the schedule by the last legislature on a temporary basis. Proponents of the increase say that it will raise about $34,000,000 in the next 2 years.

House Bill 669, which levies a tax of 1 cent per thousand cubic feet on the gathering of natural gas has already passed that body. It is now before the senate. It is estimated that this new tax will raise $28,000,000 per year.

The house oil, gas, and mining committee has voted favorably on a bill which would permit the Railroad Commission to fix minimum field prices for gas. The commission would have this prerogative only "when necessary to prevent or lessen waste, or conditions conducive thereto . . ."

The price-fixing bill says the commission "shall give effect to all such factors as it may deem just." These factors include costs of gathering and delivery, whether sold before or after liquid hydrocarbons are extracted, and difference between heating value of processed and unprocessed gas.

Arguments in favor of minimum gas prices include that such a law would aid the commission in its conservation work and would preempt the field of price fixing before the Federal Power Commission occupies it. Opponents claim the law will curtail pipe-line expansion and destroy the market for Texas gas.

Governors Study Gas Export

ARDMORE, Okla.—Representatives from Texas, Oklahoma, and Kansas attending a conference here on natural-gas reserves last week voted into being a 15-man committee to study the gas-export situation and recommended conservation measures.

The committee, composed of five men from each state appointed by the respective governors, will hold its first meeting within 30 days.

Govs. Edward F. Arn of Kansas, Johnston Murray of Oklahoma, and three Texas state senators representing Gov. Allan Shivers met with natural-gas industry officials at the conference.

Governor Murray, who called the meeting, told the gathering that it is unwise "to peddle all our gas back East where they already have coal and fuel oil in abundance." He suggested that raw products and materials of the Southwest should be processed and manufactured in the Southwest. Curbs on gas exports, he said, would necessarily attract industry to the source of the fuel.

Kansas Governor Arn pledged support to any effort made to solve the problem of gas distribution. "I believe we should make it crystal clear to the Federal Power Commission that the mere granting of a certificate for construction of a pipe line is not a guarantee of uninterrupted flow of gas to the East," he said.

New San Antonio Refinery

SAN ANTONIO.—W. H. Olmstead and C. D. Fulton have been granted a certificate of necessity by the Defense Production Administration to construct a $12,000,000 refinery here.

The plant will have a 10,000-bbl. per day capacity and will produce 100-130 and 115-145 aviation gasoline, jet fuel, and the usual line of gasoline and fuel products. Facilities proposed include a 10,000-bbl. per day atmospheric crude-distillation unit, a 5,000-bbl. fluid catalytic cracking unit, and a 2,500-bbl. HF alkylation unit. Universal Oil Products Co. is being consulted on design of processing units.

The refinery will be built on a 133-acre tract on the Austin highway in the city's northern outskirts. A new refining company is being formed, but no name has yet been adopted. Construction will not begin for at least 6 months, and an 18-month construction period is anticipated.

Geologists Plan Field Trip

MIDLAND, Tex.—A study of the relationship of Pennsylvanian beds of pre-Cisco age in the Brazos and Colorado River areas in Texas will be undertaken by the West Texas Geological Society at the group's annual field trip June 1-2.

The society, largest affiliate of the American Association of Petroleum Geologists, will study the formations along the Brazos River in the vicinity of Mineral Wells. The trip will take geologists to outcrops of correlative beds along the Colorado River with the trip ending at Brady, Tex.

Leaders of the trip will be D. H. Eargle of the U. S. Geological Survey, and Monroe G. Cheney, president of Anzac Oil Corp. and former president of A.A.P.G.

Individuals or groups interested in taking the field trip should contact Paul Kolm, Box 1595, Midland, Tex.

ECONOMICS

Imports Drop

Crude, products both down from January's record

FEBRUARY imports of both crude and products decreased slightly from the record set in January according to data of the Department of Commerce. Total imports averaged 923,000 bbl. daily for the month compared with 1,005,000 bbl. daily in January and 702,000 bbl. daily in February 1950.

Crude imports averaged 454,000 bbl. daily, off 68,000 bbl. daily from January and only 29,000 bbl. daily greater than for February of last year. Receipts from Mexico averaged 36,000 bbl. daily, unchanged from January. Decreases, on a daily average basis, were reported for all other countries. Kuwait crude dropped to 51,000 bbl. daily from 73,000 bbl. daily in January.

Receipts of residual fuel averaged 432,000 bbl. daily, a decrease of 15,000 bbl. daily from the all-time record set in January. Other products gained about 1,000 bbl. daily.

Exports for February averaged 233,000 bbl. daily, up 7,000 bbl. daily from January but 19,000 bbl. daily less than for February 1950. Crude exports decreased 6,000 bbl. daily, and lubes were off 4,000 bbl. daily. The only important gains were reported for kerosine and coke, accounting for most of the increase of 10,000 bbl. daily by other products.

IMPORTS INTO CONTINENTAL UNITED STATES

(Thousands of barrels)

	Feb. 1951	Jan. 1951	Feb. 1950
Crude—			
Mexico	1,013	1,125	585
Colombia	1,146	1,568	1,176
Venezuela	7,948	9,252	7,344
Kuwait	1,407	2,274	1,983
Saudi Arabia	1,098	1,760	687
Other	86	213	116
Total crude	12,698	16,192	11,891
Daily average	454	522	425
Products—			
Residual fuel	12,103	13,842	7,189
Other products	1,042	1,117	570
Total products	13,145	14,959	7,759
Daily average	469	483	277
Total all oils	25,843	31,151	19,650
Daily average	923	1,005	702

EXPORTS*

(Thousands of barrels)

	Feb. 1951	Jan. 1951	Feb. 1950
Crude	2,471	2,913	2,327
Gasoline	1,092	1,125	1,424
Distillate fuel	638	660	1,028
Residual fuel	644	663	644
Lube oils	950	1,163	1,147
Other products	725	493	472
Total all oils	6,520	7,017	7,042
Daily average	233	226	252

*Excludes shipments to territories.

MIDDLE EAST

Nationalization Turmoil

Riots force near shutdown of Abadan refinery in Iran; situation obscure in Iraq; unrest spreads to Pakistan

THE Abadan refinery of Anglo-Iranian Oil Co., Ltd., continued in partial operation this week despite new flareups of rioting and labor trouble stemming from Communist-supported nationalistic agitation against the British-owned company.

The 500,000-bbl. daily refinery, the world's largest, was reduced to 20 per cent of capacity over the weekend as pickets prevented 9,000 employes from returning to work.

Shipping diverted.—Shipping was diverted to prevent a backup of tankers at the loading area. Crude loadings were reported to be continuing at Bandar Mashur where the situation had quieted down. The larger part of the Abadan refinery output normally moves eastward into southeastern Asia, particularly India.

Three foreigners and six Iranians were killed in an outburst of violence at Abadan last week. This was followed by a widening of the strike at Abadan which previously had included only about 1,000 apprentices and technical students.

Evacuation requested.—Teheran reports early this week said American employes of United States contracting firms at Abadan had requested evacuation. The evacuation requests could not be confirmed in New York. Most of these Americans are with Foster Wheeler Corp. and other refinery contractors working on a catalytic cracking unit and other additions to the Abadan refinery.

There were hopes for an early resumption of full operations at Abadan since Iranian officials seemed determined to restore order. Troops with tanks broke up a demonstration of 4,000 strikers by firing into the air.

The strikes, which involved about 12,000 of the company's some 80,000 workers, were originally touched off, in part at least, by the company's revoking of an out-station allowance paid workers at Bandar Mashur and Agha Jari. Living accommodations, which were the basis for the allowance, had subsequently been provided. A government commission was investigating the strikes, and it was anticipated the allowance would be reinstated pending negotiations.

Talks resented.—Meanwhile in Washington a delegation of high British officials continued discussions of the Iranian situation with the State Department. (See accompanying story.) The conferences were resented in Iran, where government officials took the position the dispute concerned only their country and the British oil company. There also was fear that the discussions were aimed at blocking the already-voted oil nationalization.

A somewhat ironic note to the overall situation was provided in the news that the Iranian Government has again requested assistance from the company in suppressing a locust plague in southeastern Iran. The company, which the government now proposes to take over and operate, was supplying airplanes, technicians, and materials as it has done in other plagues in previous years.

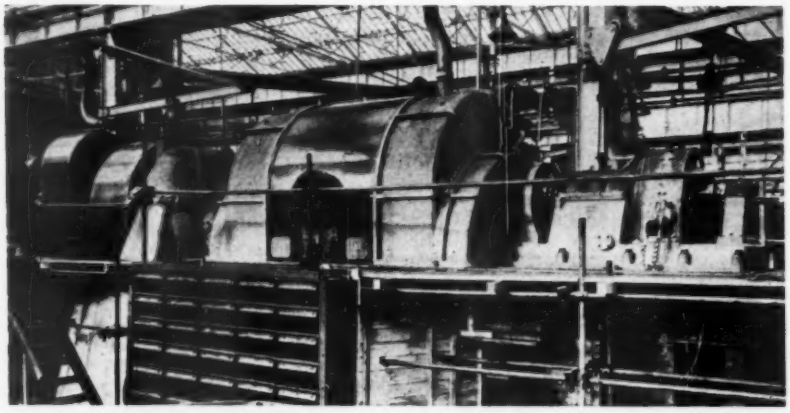
In Iraq, negotiations are scheduled to open in the near future for a new agreement which will be based on an offer of Iraq Petroleum Co., Ltd., to raise its payments to the Iraq Government to the level of those in other Arab countries, presumably Saudi Arabia where a 50-50 participation arrangement was worked out last December.

Other developments.—There were these other developments in the Persian Gulf oil-government situation last week:

1. Max Thornburg, wartime oil adviser to the State Department, asserted in Teheran that British opposition, with State Department support, had prevented him from becoming an oil consultant to the Iranian Government. The United States ambassador denied Thornburg had been ordered by the State Department to leave Iran, but it appeared his outspoken criticism of the British was considered embarrassing. Thornburg said he had been asked by Iranian Premier Ala to serve as an adviser in connection with the oil nationalization. Thornburg for the last 2 years has been head of a group of consultants studying ways of improving Iran's economy.

2. London reports suggested Anglo-Iranian is considering new offers to the Iranian Government which will accept the principle of nationalization. The atmosphere in Teheran, at least prior to the riots, appeared to be becoming more favorable to a compromise. A legislative committee is studying ways to implement nationalization, but an official in Teheran said there are "as many plans as there are Iranians."

3. A report from Miami Beach, Fla., quoted Ray Ryan, independent producer of Evansville, Ind., as saying he heads a group which is prepared to take over the concession of Basrah Petroleum Co., Ltd., in southern Iraq if it is canceled by the Iraq Government. Basrah Petroleum is an affili-



New Turbo-Alternator Installed

This British-built 10,000-kw. turbo-alternator is being installed by the Shell organization at Pueblo Viejo in western Venezuela. It will provide additional power for fields and camps along the eastern shore of Lake Maracaibo. The manufacturing time of 15 months by C. A. Parsons & Co. set a record for delivery of this type of equipment to Shell in the United Kingdom. The equipment, built at a cost equivalent to nearly $240,000, illustrates the continued efforts of the British companies to maximize purchases outside the dollar area. The five previous units of this type at Pueblo Viejo have come from the United States.

ate of Iraq Petroleum Co., Ltd., and has made outstanding discoveries in the last 2 years in the Basrah area, which it is planning to produce commercially beginning next year.

Ryan said he had been approached by the Iraqis and that he was keeping the State Department informed. He said Millard E. Tydings, former Maryland senator, and his father-in-law, Joseph E. Davies, were legal advisers to the group which includes James E. Breuil, Oklahoma City; William Rickett, London; Robert Hayes, Kerrville, Tex.; and Burke Oil Co., San Antonio. Ryan said the group has arrangements with Italian interests for the disposal of the Bahrah crude.

4. In London, a writ was served on Iraq Petroleum Co., Ltd., in connection with the suit instituted by the Iraq Government to determine whether the company will pay its royalties on the basis of the official rate as at present, or the free-market rate of gold. The royalty under the official rate is equivalent to about 34 cents a barrel.

5. The nationalization plans of Iran had direct repercussions in Pakistan where employes of several oil companies met in Karachi and demanded that similar action be taken against the industry in that country. Pakistan has one refinery and produces about 4,000 bbl. daily.

Iranian Oil Talks

Officials discuss ways to make up possible deficit

BRITISH and American officials are reported to have devoted more of their talks on Middle East conditions last week to discussion of how present markets for Iranian oil could be supplied in the event of an interruption of production in Iran than to what the British should or could do to upset the nationalization decree of the Iranian Government.

Exhaustive studies of the world supply situation are understood to have been prepared for the conference by competent government agencies, in which consideration was given not only to the effect of an interruption of the Iran supply but also to the results to be anticipated from the loss of the oil from much broader areas of the Middle East.

Purely exploratory. — State Department officials said the talks were purely informal and exploratory since there is nothing in the Iran situation which calls for any action on the part of the United States. The Iranian nationalization is a matter between that government and Anglo-Iranian Oil Co., but concern is naturally felt in Washington over the possibilities that other Middle East countries may follow Iran's example. That concern, however, has been alleviated to some extent by reports that Iraq Petroleum Co. has undertaken negotiation of a new profit-sharing agreement with the Iraq Government patterned along the lines of the agreements of American oil companies in Venezuela and Saudi Arabia.

A serious supply problem would be created by any interruption of production in Iran, by throwing an additional heavy burden on the Western Hemisphere industry now struggling to increase output quickly for our own defense program.

Tough job.—A survey of possibilities for providing an additional 450,000 bbl. a day of products showed that there is a little excess refinery capacity in Western Europe and a little in Japan, but the total is not very impressive and the bulk of the burden would fall on the Americas. With our refineries operating at a very high rate, it would be a tough job to squeeze out the additional products that would be required.

Socony Price Flip-Flop

Socony-Vacuum Oil Co., Inc., only Middle East oil supplier which publicly posts export crude prices, raised its prices 16½ cents per barrel for f.o.b. eastern Mediterranean shipments last week then was forced to rescind the increase when the other two suppliers of Middle East crude failed to follow suit.

Socony made no announcement of the reason for the price increases, from $2.41 to $2.57½ per barrel, but they were known to be due to higher tanker rates. Shipments affected were Saudi Arabian crude at the Sidon, Lebanon, terminal of the Trans-Arabian pipe line and Iraq crude at Tripoli, Lebanon, the loading point for oil delivered through the 12 and 16-in. lines from Kirkuk field.

The other two suppliers are Caltex and Esso Export Corp., Standard Oil Co. (N. J.) affiliate. Caltex decided against following the Socony increase last week. It is known that Caltex has a provision in many of its supply contracts guaranteeing buyers against increases through this year.

LATIN AMERICA

Venezuelan Decree

Government terminates company-union deadlock

THE Venezuelan Government last week abruptly terminated contract negotiations between oil companies and labor unions and issued a decree granting some demands of the workers and refusing others.

The decree was designed to settle the labor-management negotiations which had reached a virtual deadlock. It was promulgated by the governing junta and provided a new collective contract to run for 2½ years.

Wage increases. — The contract gave wage increases ranging from 60 cents a day for workers earning $6 or less, to 90 cents a day for those earning $9 and over. It allowed some of the social benefits demanded by the workers, including certain extensions in commissary, hospital, restaurant, and school facilities as well as 10 extra days paid vacation yearly for all workers.

Industry sources in Caracas estimated that the concessions given in the contract would cost the entire Venezuelan oil industry $30,000,000 extra a year. This was based on the estimate of $10,000,000 additional cost to Creole Petroleum Corp., largest Venezuelan producer. Creole employs about 15,000 of the country's estimated 50,000 oil workers.

Loss in taxes.—The government, as a result of the contract which it decreed, will lose about $10,000,000 a year in income taxes from the oil companies.

Dr. Carlos Tinoco Rodil, minister of labor, addressed the Venezuelan oil workers in a radio talk after the new contract was decreed. He said those demands not granted would receive "careful consideration." The new minimum wage of $4.80 a day, the minister said, is far in excess of wages paid oil workers elsewhere, and the freezing of commissary prices provided in the decree insures the worker that the purchasing power of his wages would remain stable. Since the cost of living had not risen proportionally, the wage increases, he added, were decreed "in recognition of the contribution made by the oil workers."

Negotiations between the labor groups and the companies had been under way under government sponsorship for the last several months. The previous agreements expired early in February, and the government extended their provisions until a new settlement was reached. The labor groups had presented a number of demands, which, it had been estimated, would require more than the total earnings of some of the companies to meet.

Guatemala Outlook Improves

A new and less restrictive attitude toward foreign oil capital in Guatemala is regarded as likely to follow the recent inauguration of the country's new president, Jacobo Arbenz.

One view is that the new Guatemalan president will change the present petroleum law to permit free operation of private oil companies under more liberal terms than those allowed by the outgoing administration. After his inauguration, President Arbenz said that "honorable private capital, whether it be foreign or do-

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mestic, that will try to benefit the general economy of the country, will be welcome."

In 1949 the Guatemalan Congress passed a petroleum law which reflected highly nationalistic sentiment and hostility to foreign oil investments. Among other provisions, it required that any equipment imported become property of the government, placed exports under strict control, and specified a local refinery if production was obtained.

Three United States companies were investigating the possibility of exploration in the country in 1949. The three, Atlantic Refining Co., Ohio Oil Co., and Standard Oil Co. (Ohio), abandoned their plans after it became apparent that workable contracts would not be forthcoming.

"Offshore" Well

Directional hole extends Trinidad field seaward

FIRST oil production under a marine drilling license in Trinidad has been obtained by Kern Trinidad Oilfields, Ltd., in a directionally drilled seaward extension of the existing onshore Guapo field.

Total depth of the well was 3,300 ft. The Cruse Miocene producing zone was found between 2,250-2,580 ft. at horizontal displacement seaward from high-water mark of 430 ft. The drilling operation was similar to those which have been carried out at Huntington Beach, Calif.

Guapo is one of the main group of fields in the southwestern part of the island. Unofficial reports credited the new well with 300 bbl. daily initial production, but W. N. Foster, the Trinidad Government petroleum technologist, said the well had not been flowing long enough to permit a reliable forecast of commercial production.

News of the discovery attracted attention in the United States and Britain as well as in Trinidad, but both Foster and R. J. Maitland, general manager of the company, emphasized that it is not a new offshore marine field discovery that will materially increase the island's reserves. Maitland said the well is producing from a horizon which is purely a seaward extension of the company's existing field at Guapo.

Foster also pointed out that well was a directionally drilled extension and commented: "These foreshore locations are limited in number and will do little or nothing to determine the production capabilities of the marine areas.

"Real marine drilling will be vastly more costly than these foreshore locations, the results of which cannot be taken as giving any indication of the commercial success or failure of marine exploration. In order that the marine areas may be commercially productive, new reservoirs must be discovered which are more prolific than the wells of Kern Trinidad Oilfields, Ltd. There is as yet no evidence to justify any optimistic forecast in this respect."

Y.P.F. Makes Discovery

A new oil discovery, the first in Argentina in the last several years, has been made by Yacimientos Petroliferos Fiscales near the Bolivian border about 40 km. northeast of the town of Tartugal.

According to unofficial reports, the well, Campo Duran 6, went to about 3,900 m. (about 12,800 ft.) total depth, and flowed 180 cu. m. daily (about 1,130 bbl.) of light-condensate-type crude along with some 17,000,000 cu. ft. of gas from what was believed to be about 300 ft. of oil and gas sand topped at around 9,000 ft.

The well was opened in the presence of a party of officials of the government oil organization. In a preceding test run, one of three 3-in. flow lines blew out under high pressure from the well, and a driller was killed and two persons injured.

The well has been named C. D. 6—Vergilio de Brito in memory of the deceased driller. The well was originally started March 15, 1949. Y.P.F. had previously drilled several dry holes in the area, none of which went as deep as the discovery because of fishing jobs. C.D. 6 ranks as one of the deepest wells drilled in Argentina. Y.P.F. presumably has a pipe line at its Tranquitas field, some 50 km. south.

The discovery has been described as the first of apparent significance in Argentina since the southern extension of Comodoro Rivadavia at Caleta Olivia was brought in several years ago. Y.P.F. also has had some success in exploratory operations at the southern tip of the country.

Gas Line Progressing

Construction of a 311-mile natural-gas pipe line from Plaza Huincul to General Conesa is now reported to be about two-thirds completed. At General Conesa the line joined the main 10-in. built 2 years ago to deliver gas from Comodoro Rivadavia fields to Buenos Aires. The Plaza Huincul branch is being laid by the Italian organization, Techint, which also built part of the main line to Buenos Aires.

The Argentine gas pipe-line projects are being carried out by Gas del Estado, a state organization. Last year, in a reorganization, Gas del Estado, as well as the state oil administration, Yacimientos Petroliferos Fiscales, were included among the several branches created under the National Office of Energy and Mining in the Ministry of Industry and Commerce.

Lube Plant Approved

The Ministry of Mines and Hydrocarbons in Venezuela has granted approval for the construction by Venezuelan Oil Concessions, Ltd., (Shell) of a lubricating-oil plant at its refinery at Cardon on the Paraguana Peninsula.

The proposed lubricating-oil facilities will have a capacity of 629,700 bbl. annually. The Cardon refinery has a listed crude-input capacity of 40,000 bbl. daily, with 32,000 bbl. daily cracking capacity.

Second Cuban Offshore Test

Cuban Gulf Oil Co. is now rigging up preparatory to commencing its second offshore exploratory well on the northern coast of Cuba.

The well will be drilled in the Bay of Cardenas about 50 miles east of the first test. A platform will be used. The first well went to 5,045 ft. and found some noncommercial heavy oil before it was abandoned a year and a half ago.

Products Line Planned

Preparations are being made for laying a products line for the State of Cundinamarca in Colombia, contracted by Williams Brothers Corp.

The project is a 6-in. line extending 139 km. (approximately 82 miles), from Puerto Salgar on the Magdalena River to Bogota. Actual construction is expected to commence later this year. David Louthan is the contractor's manager with headquarters at Bogota.

Asphalt-Plant Expansion

Brighton Terminal, Ltd., operator of an asphalt plant in Brighton, La Brea, Trinidad, is constructing a crude-oil distillation unit at its refinery, which will have a daily crude capacity of 4,000 bbl. The plant, now rated at 1,000 bbl. daily, will produce about 1,500 bbl. of asphalt daily when the new unit goes into operation.

Work also is under way on remodeling of existing asphalt-processing facilities.

Drilling Contract Signed

Isthmus Development Co., Amarillo, Tex., has concluded a field-rehabilitation and drilling contract with Petroleos Mexicanos.

Jose Saldivar, Isthmus representative in Mexico City, said the company will develop Ixhuatlan, Teapa, and Moloacan fields and that drilling equipment from New Orleans and Galveston is scheduled to arrive at Coatzacoalcos in southern Mexico in the near future.

Isthmus and Pemex reach a tentative agreement last November but

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final details were not settled until the conclusion of the recent contract. Isthmus expects to begin operations immediately.

Other recent Mexican developments include the ordering by Pemex of 1,115,000 ft. of 16-in. pipe from Kaiser Steel Co. with deliveries to begin in August. Pemex has been working to avoid further shortages of materials which have already delayed construction of both the trans-Isthmus oil line and the natural-gas line from Torreon to Monterrey.

Colombian Activity

Moderate upturn taking place in exploration

A MODERATE upturn is taking place in exploratory activity in Colombia, the result largely of the liberalization of the country's oil laws last year.

Most recent exploratory operation to get under way was in the Floresanto block of 10,000 hectares in the Sinu River area where a group of independents headed by Allan Guiberson, oil-equipment manufacturer, of Dallas, spudded in Guiberson 1.

The well is being drilled with cable tools by C. J. Simpson, Dallas contractor, and will attempt to prove up some of the shallower sands for commercial production. The group is represented in Colombia by Victor Oppenheim, geologist. Socony-Vacuum Oil Co., Inc., surrendered the Floresanto block in 1947 after drilling 12 wells and obtaining some production of 50°-gravity oil between 1,203-2,217 ft. The Guiberson well is about 100 m. from Socony-Vacuum's No. 1 test.

Other work planned.—Several other companies are reported preparing to renew or expand exploratory work in Colombia. Tropical Oil Co., which is now drilling below 4,960 ft. on its Balsamo wildcat spudded in February, has obtained a concession on the Totumal block in the mid-Magdalena Valley, and a road is now being constructed to a wildcat location. In the same area, adjacent to and southwest of the Totumal block, Socony-Vacuum has signed for the Isaza area. Richmond Exploration Co. (Standard Oil Co. of California) has taken a concession on the Perico area located about 40 miles southwest of the port of Riohacha and including a continental-shelf section.

Three concessions in Colombia which were signed last year became firm in mid-January. These were the Balsamo area, where Tropical is now drilling; the Floresanto block where the Guiberson group is operating; and the Magangue block, taken by a Shell affiliate. Texas Petroleum Co. (Texaco) which has been the most active exploratory operator in Colombia, is building a road to a new field wildcat about 10 km. east of its Velasquez field.

Difficulties.—Two years ago several companies followed one another in withdrawing from exploration in Colombia. The reason was both a somewhat discouraging record in wildcatting and the existence of hampering legislation and taxes. The major legal obstacles to exploration activity in the country were removed by two decree laws, the first in January 1950 and the second last November. Among other provisions, the November amendments allowed an operator to surrender a concession the first 3 years without exploration or wildcatting and opened up the reserved zones of the country. Further encouragement to exploration resulted from Colombia's recent devaluation of the peso to 2.50 to the dollar which in effect reduces exploration fees. The government is expected to reclassify capital-goods imports in order to prevent a higher tax on their ad valorem value.

Patharia Hills Wildcat

The Patharia Hills wildcat in East Pakistan was spudded in recently by Pakistan Petroleum, Ltd., in a ceremony attended by the governor of East Pakistan. The company is affiliated with Burmah Oil Co., Ltd., and the well represents the latest of the continuing efforts to extend the presently small oil production found in the Indian subcontinent. The company is using a diesel rig with a capacity to reach about 7,500 ft. Patharia well is located about 22 miles from Shamshu Nagar. A recent report from Calcutta said Assam Oil Co., Ltd., which operates in India, is preparing to drill a new test at Nichuguard in the Naga Hills and that the well is expected to be spudded in in May.

Oil in Brazil

J. E. Pogue reviews local oil setup in Rio address

DEVELOPMENT of a country's oil resources by a government agency lacks the element of competition, and where competition has not existed, very little oil has been found in the world, Joseph E. Pogue, petroleum consultant to the Chase National Bank, told the American Chamber of Commerce in Rio de Janeiro, Brazil, last week.

Pogue reviewed the general economic pattern of oil development in his talk on "Oil in Brazil." His remarks appeared particularly pertinent, not only in view of the recent steps toward oil nationalization taken in Iran, but also since Brazil itself has a state oil organization along with restrictive legislation which has excluded private foreign capital from exploration and development.

Drive lacking.—In the government oil organization, Pogue said, the drive and force of the competitive type of enterprise are absent. "The state operation, of course, has many proponents and the advantage of conforming to the political aspirations of large segments of people."

"Results attained by this method, however, have not been conspicuously successful. Given time and the benefit of favorable evolution, its achievement may become more noteworthy, but as a system, it possesses certain inherent mechanical and economic drawbacks which, irrespective of the knowledge and skill of the managerial personnel, can be overcome with difficulty, if at all."

EUROPE

British Hike Gasoline Tax

A 25 per cent increase in the already stiff tax on motor fuel was provided in the government budget introduced in the British House of Commons last week.

Besides the 4½ pence increase in the gasoline tax, the government increased the purchase tax to 66⅔ per cent on automobiles. The higher taxes on gasoline and automobiles apparently were imposed not only to raise revenue but also to curtail driving. The tax on gasoline was doubled to 1 shilling and 6 pence last year, half of the selling price at that time. The new levy brings the tax to 1 shilling, 10½ pence.

The tax will result in a price of 3 shillings 6 pence for motor fuel of standard 70-72 octane in the inner or London zone. This is equivalent to about 49 cents per Imperial gallon, or about 42 cents per U. S. gallon.

PERSONALS

Gasoline Man

Laborer to manager is history of W. F. Matheny

A VETERAN of the natural gasoline industry is W. F. Matheny, vice president and general manager of Sid Richardson Gasoline Co. and Sid Richardson Carbon Co.

A native of Dublin, Tex., Matheny attended John Tarleton College and University of Oklahoma graduating with a degree in chemical engineering.

In 1923 he joined Roeser & Pendleton in the Breckenridge area as a laborer. Soon afterwards the firm sold out to Phillips Petroleum Co. in whose employ he remained until 1947.

Matheny worked up, job by job, to assistant division superintendent of Phillips' natural gasoline department, and then restarted as junior engineer and worked through the engineering section of the department to chief process and design engineer.

In 1943 he was appointed assistant manager of the department in charge of operations, serving as active manager from 1943 until 1946.

He resigned in April 1947 to join the Sid Richardson interest in Fort Worth.

Harold Fendler and **Dr. J. B. Dodge** have been elected directors of Sunset Oil Co., Los Angeles.

R. P. Moscrip, mechanical engineer in Shell Oil Co.'s Houston area production department, has been transferred to Midland, Tex., as area chief mechanical engineer.

Joseph E. Morero, chief geologist for Skelly Oil Co., has been elected vice president in charge of the geological department. **A. L. Cashman** has been elected vice president in charge of the land and lease department, and **C. L. Swim,** presently assistant secretary and assistant manager, has been elected secretary and treasurer to succeed **F. T. Hopp** who has retired.

Dr. Kenneth K. Kearby, of Cranford, N. J., has been appointed a senior research associate for Standard Oil Development Co. The appointment was made in recognition of his achievements in the chemistry of synthetic rubber and high-octane gasoline.

Barney C. McCashland, geologist for Cities Service Oil Co. at Jackson, Miss., has been transferred to Olney, Ill., as district geologist.

L. A. Messmer has been elected president of the newly organized Dome Oil Corp. at Evansville, Ind. Other officers are: **O. R. Messmer,** vice president and field superintendent; **Jim Graham,** of New York, vice president and secretary; and **J. F. Dietz,** treasurer.

C. H. Calvert, formerly petroleum engineer for Caran Brothers Engineering Co. at Austin, Tex., has been transferred to Corpus Christi, Tex., as district engineer, engaged in mud logging, core analysis, and reservoir engineering.

Steven J. Leach, drilling and production engineer for Humble Oil & Refining Co. at Wink, Tex., has been transferred to Hobbs, N. M., as district petroleum engineer.

T. S. JOHNSTON

Thomas S. Johnston, vice president of Interprovincial Pipe Line Co., Toronto, has been elected president, succeeding **O. B. Hopkins,** who has taken a post with the Canadian Government. Joining Standard Shipping Co. in 1928, Johnston later went with Lago Oil & Transport Co., where in 1941 he became assistant manager of the marine department at Aruba, N. W. I. A year later he was loaned to Standard-Vacuum Oil Co. as an assistant manager of the marine department. In 1944 he went to South America to study equipment on the Magdalena River in Colombia. He returned to Canada in 1945 as assistant manager of Imperial Oil, Ltd.'s marine department, and at the time he joined Interprovincial was serving as assistant to the vice president in charge of transportation and supply.

Leland E. Wilson, engineer for Atlantic Refining Co., has been transferred from Odessa to Corpus Christi, Tex.

William R. Seuren, formerly assistant to **W. J. Carthaus,** vice president in charge of Deep Rock Oil Corp.'s manufacturing and research division, has been named supervisor of lubricating-oil finishing at the firm's Cushing, Okla., refinery. **Donald T. Axon** will fill the position vacated by Seuren's promotion. Seuren joined the firm in 1949 after receiving his master's degree in business administration from Harvard University.

Gordon Kiddoo, formerly director of research and development for Continental Carbon Co., has been appointed assistant director of National Research Corp.'s petrochemical-research department. Since graduating from Cornell University in 1942 he has been associated with Chicago Corp., Hydrocarbon Research, Inc., The Texas Co., and Continental Carbon.

William D. Kinsell has been appointed manager of the construction-engineering department of Pure Oil Co., and **Daniel E. Sullivan,** former director of engineering, has been appointed engineering consultant to the firm.

W. G. Tierpey has been named executive vice president of Derby Oil Co., and **Carl T. Naumburg** of New York has been elected a director. **H. E. Zoller,** who retired as president, was reelected a director at the recent stockholders' meeting and will remain with the company in an advisory capacity.

O. V. Wells, vice president; **Earl E. Beyer,** secretary-treasurer; and **R. C. Schneider,** chief engineer, have been added to the board of directors of Valley Gas Pipe Line Co. **J. Leslie Witt,** former vice president of the firm, who recently succeeded **Curtis B. Dall** as president, and **L. A. Casey,** vice president, remain on the new board.

Robert Brookings Smith has been elected a director and a member of the executive committee of Panhandle Producing & Refining Co.

G. W. Brock, formerly with Northern Ordnance, Inc., has joined Skelly Oil Co. at Oklahoma City as geologist.

G. B. Lowther, corrosion engineer for Mississippi River Fuel Corp. at St. Louis, has been transferred to Shreveport as construction superintendent in charge of a new pipe line and gathering system.

PERSONALS

R. F. Spradlin has replaced **Frank Herrington** in Continental Oil Co.'s San Antonio, Tex., scouting department. Herrington has been recalled to military service.

Dr. Raymond Victor Bailey, now of the faculty of University of Mississippi, has been appointed head of the department of chemical engineering in Tulane's school of engineering at New Orleans, replacing **Dr. Francis M. Taylor,** who will devote his full time to teaching and research.

Minor S. Jameson, Jr., assistant to the president of the Independent Petroleum Association of America, is on loan to the Petroleum Administration for Defense on special assignments.

Allan M. Grant, consulting geologist, has opened offices in Corpus Christi, Tex. A graduate of Cornell University, Grant went to Corpus Christi with Humble Oil & Refining Co. in 1936. He joined The Chicago Corp. in 1948, leaving this year to enter consulting work.

Howard C. Kauffman junior petroleum engineer at Great Bend, Kans., for Carter Oil Co., has been transferred to Vicksburg, Miss., as district engineer. **H. Benjamin Bullard, III,** petroleum engineer at Purcell, Okla., has been transferred to Oklahoma City. **H. H. R. Sharkey,** assistant to the exploration manager at Tulsa, has been transferred to Denver as senior geologist. **Raymond E. Langen,** field geologist at Manhattan, Kans., has been transferred to Mattoon, Ill., and **Earl C. Cockrum,** production geologist at Dix district, Illinois, has been named district geologist.

Jack D. Duren, exploitation engineer for Shell Oil Co., has been transferred from Great Bend, Kans., to Sterling, Colo.

Ira Stein, formerly with Bridwell Oil Co. at Alice, Tex., has joined The Chicago Corp. as manager of the new Abilene, Tex., division land and geological office.

B. L. Geopfert, mechanical engineer for Shell Oil Co., has been transferred from New Orleans to Delta, La., as district mechanical engineer. **S. W. Clark,** exploitation engineer, has been transferred from Lake Charles, La., to the Delta district. **R. L. Corbeille,** junior geologist at Houston, has been transferred to Shreveport as subsurface geologist. **A. R. Newman,** exploitation engineer, has been transferred from New Orleans to Houston. **C. E. Person,** junior geologist at Houston, was promoted to subsurface geologist at Lake Charles. **H. O. Amadon,** exploitation engineer in the Delta district, has been promoted to district engineer. **J. D. Baribault,** mechanical engineer, has been transferred from New Orleans to the Delta district; and **H. Bennett, Jr.,** mechanical engineer, transferred from Houston to New Orleans.

Edward W. Scott, district geologist for Union Oil Co. of California at Shreveport, has been transferred to Houston as assistant division geologist.

A. B. McCallum has been appointed geologist in charge of Taylor Refining Co.'s newly created office at San Angelo, Tex. He has been with firm for several years at McAllen, Tex.

Otto Filligame, compressor station man in the New Orleans district for United Gas Corp., has been transferred to the Shreveport district as chief engineer at the Rodessa station.

Roger D. Stanwood, with Tide Water Associated Oil Co. for more than 11 years and recently assistant superintendent of its gas-utilization department, has accepted the position of assistant to the vice president of the gas supply of Transcontinental Gas Pipe Line Corp. He graduated from Dartmouth College in 1939 and is a member of the American Institute of Mining and Metallurgical Engineers.

G. W. Ledingham, formerly chief geologist for Western Gulf Oil Co., Los Angeles, has been promoted to manager of exploration. **M. J. Hill** will

***MEASUREMENT MEN.**—General and executive committees of the twenty-sixth annual Southwestern Gas Measurement Short Course held in Norman, Okla., last week. Seated: Kate A. Niblack, Oklahoma Utilities Association, Oklahoma City; M. A. Abernathy, vice president, United Gas Corp., Shreveport, principal speaker; W. H. Carson, dean of the college of engineering at the University of Oklahoma, Norman; and Ray L. Rountree, gas measurement superintendent, United Gas Pipe Line Co., Shreveport. Standing, left to right: James L. Griffin, superintendent of Northern Natural Gas Co., Omaha; W. H. Woods, Gulf Oil Corp., Houston; W. A. Griffin, vice president, Daniel Orifice Fitting Co., Houston; Ben F. Worley, superintendent of distribution for the Louisiana and Mississippi division, United Gas Corp., Shreveport; Earl Kightlinger, Alabama-Tennessee Natural Gas Co., Florence, Ala.; Max K. Watson, natural gas consultant, Amarillo, Tex.; T. S. Whitis, West Texas Gas Co., Lubbock, Tex.; W. R. McLaughlin, Rockwell Manufacturing Co., Dallas; Gilbert Estill, gas measurement superintendent, Oklahoma Natural Gas Co., Tulsa; K. R. Tibbets, contract representative, Warren Petroleum Corp., Tulsa; and Roland O. Cox, office supervisor of measurement, Lone Star Gas Co., Dallas.*

PERSONALS

replace Ledingham as chief geologist. **T. H. Wallace,** assistant to the vice president, will also be manager of exploitation.

O. H. Berry, Jr., formerly eastern division petroleum engineer at Houston for Standard Oil Co. of Texas, has joined Wilshire Oil Co. at Midland, Tex., as drilling and production engineer.

Loren F. Kahle has been reelected executive vice president of Interprovincial Pipe Line Co. and **F. G. Hall** has been elected vice president.

E. V. McCollum and **Craig Ferris,** geophysicists, have formed GeoSeis, Inc., at Tulsa. They are now associated with E. V. McCollum & Co., which will be closely associated with the new firm.

Guy Mabee, president and owner of Guy Mabee Drilling Co., will head the newly organized Tri-M Production Co. at Midland. **Louis Mabee,** president and owner of Louis Mabee Drilling Co., will be vice president, and **Joe Guy Mabee,** a vice president and assistant secretary - treasurer. **B. R. Mathews** will be secretary-treasurer of the new production company, and **Ellis Scobey,** geologist.

Harry E. Legendre has resigned as general superintendent of drilling and production with **Frank** and **George Frankel,** independent oil operators, to devote full time to his own oil-field engineering business at Midland, Tex.

James E. Lewark, senior geologist in Carter Oil Co.'s Mattoon, Ill., office, has been promoted to assistant division geologist, while **J. Peter Smith,** Dix district geologist, has been transferred to the division office at Mattoon. **Robert Waldram,** of Carmi, Ill., has been transferred to Mattoon.

Malcolm M. Mulholland, senior geologist at Grand Rapids, Mich., for Carter Oil Co., has been promoted to district geologist.

William C. Dougherty, assistant foreman in the Kermit, Tex., district for Magnolia Petroleum Co., has been promoted to production foreman. Transfers of producing division men include: **Kenneth R. Joynt,** from Lake Charles, La., to the Vanderbilt, Tex., district; **O. B. Jordan,** from Brownfield, Tex., to the Lake Charles district; and **John R. Hissom,** from Healdton, Okla., to the Brownfield district; all are assistant district superintendents. **C. P. Latting,** production foreman at Salem, Ill., has been transferred to the Rusk producing district with headquarters at Kilgore, Tex.

John H. McCarty has returned to Shell Oil Co.'s Houston refinery as superintendent of construction. Since leaving Houston in 1949, McCarty has spent most of his time in Montreal, Canada.

James F. Ormond, production department field engineer for Sunray Oil Corp. at Midland, Tex., has been awarded the National Safety Council's president medal. Ormond applied artificial respiration to a fellow workman who inadvertently came in contact with a wire carrying 12,700 volts of electricity while working on a West Texas lease near Odessa.

G. L. Helmke, geologist with Stanolind Oil & Gas Co., and **Earl West,** geologist with Continental Oil Co., have resigned to open offices as consulting geologists at Casper, Wyo.

Gordon Kirby, formerly with Petty Geophysical Co., has joined Murphy Corp. as Rocky Mountain geologist with headquarters at Denver. **Nolan Ashburn,** formerly instructor at Centennary College, Shreveport, has joined Murphy as geologist in Denver.

Charles Sternberg, district geologist for Sunray Oil Corp., has resigned effective May 1, to do independent geological consulting work at Denver.

O. I. Jantz, party chief for Amerada Petroleum Corp., has been transferred from Lincoln, Kans., to Center, Kans.

J. E. Williams, recent graduate geological engineer from Oklahoma University, has joined the staff of **Howard D. Atha,** independent producer at Evansville, Ind.

T. P. Ellsworth, until recently chief geophysicist for Richfield Oil Corp., Los Angeles, has joined Geophysical Service, Inc., as manager of the West Coast division with headquarters in Bakersfield, Calif.

Tom Orr, executive secretary of the Kansas Independent Oil and Gas Association, is on leave of absence to aid the Independent Petroleum Association of America at its Washington office.

Osher Goldsmith, of Tyler, Tex., has been appointed director of the fuels and chemicals division in the regional Office of Price Stabilization at Dallas. Since graduating from Missouri School of Mines in 1920, Goldsmith has been employed by both major and independent oil companies in the production, pipe-line, refining, and marketing phases of the oil business in East, West, and North Texas oil fields. Since 1937 he has been an independent oil producer and consulting petroleum engineer, with offices in Tyler.

Frank M. Porter, president of the American Petroleum Institute, has been named the American vice president of the Third World Petroleum Congress to be held at The Hague, Netherlands, May 28 to June 6. Other Americans appointed to the committee of honor include: **W. Alton Jones,** president of Cities Service Co., and chairman of the board of the A.P.I.; **Lt. Gen. E. O. Thompson,** member of the Texas Railroad Commission; and **Dr. W. E. Wrather,** director of the U. S. Geological Survey. **Dr. E. V. Murphree,** of Standard Oil Development Co., is chairman of the national committee for the United States of America, the vice chairmen being **F. S. Clulow,** Shell Oil Co., and **Dr. Paul D. Foote,** Gulf Research & Development Co.

Roy J. Diwoky, executive vice president of Pan-Am Southern Corp., has succeeded **C. J. Guzzo** as vice chairman of the Gulf-Southwest District Oil Information Committee.

DEATHS

Thomas Clarkson, 77, retired petroleum technologist formerly associated with Standard Oil Co., died April 15 in Tulsa. He has been with various foreign oil firms in India, South America, France, and Mexico. He came to the United States 30 years ago with Standard Oil, remaining with the firm until his retirement 12 years ago.

William M. Wood, 58, head of the right-of-way and claims department for Lone Star Gas Co. in Abilene, Tex., died March 15. He had been with the firm 14 years.

P. G. Wilson, 52, foreman of the machine shop for Sinclair Oil & Gas Co. at Houston, died April 7.

James Moss Slator, Jr., 58, land attorney for Gulf Oil Corp., Houston, died April 10.

William A. Nordan, 42, local manager for Consolidated Chemicals Co. at Baytown, Tex., died April 9.

Joseph B. Mayer, 103, oil producer who has had oil properties in the Owensboro, Ky., section since 1929, died April 5.

Ralph Akin Chase, 60, lease operator for Gillespie Oil Co., died April 9 at Turley, Okla.

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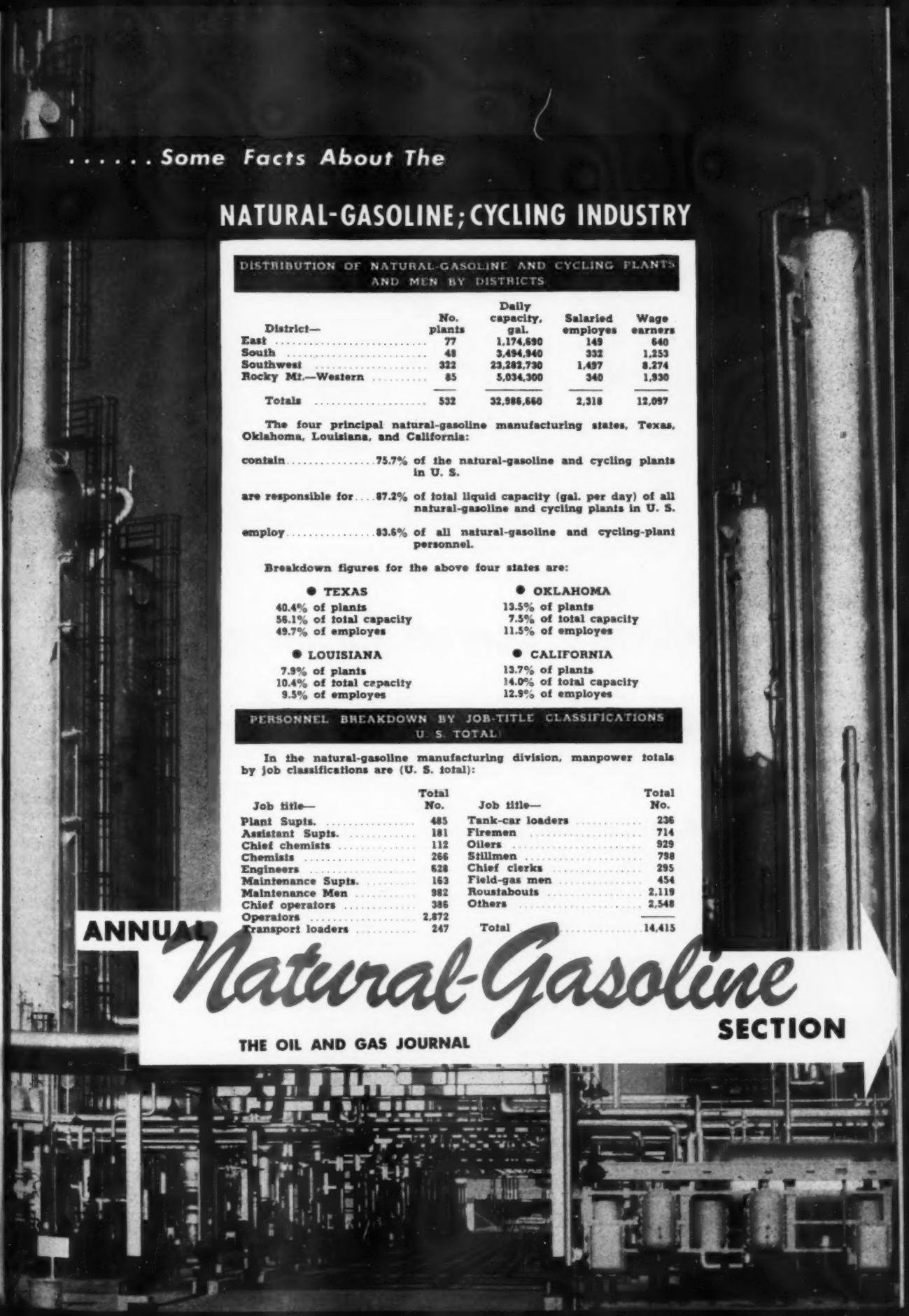

. . . . . Some Facts About The

NATURAL-GASOLINE; CYCLING INDUSTRY

DISTRIBUTION OF NATURAL-GASOLINE AND CYCLING PLANTS AND MEN BY DISTRICTS

District—	No. plants	Daily capacity, gal.	Salaried employes	Wage earners
East	77	1,174,690	149	640
South	48	3,494,940	332	1,253
Southwest	322	23,282,730	1,497	8,274
Rocky Mt.—Western	85	5,034,300	340	1,930
Totals	532	32,986,660	2,318	12,097

The four principal natural-gasoline manufacturing states, Texas, Oklahoma, Louisiana, and California:

contain ..... **75.7%** of the natural-gasoline and cycling plants in U. S.

are responsible for .... **87.2%** of total liquid capacity (gal. per day) of all natural-gasoline and cycling plants in U. S.

employ ..... **83.6%** of all natural-gasoline and cycling-plant personnel.

Breakdown figures for the above four states are:

● TEXAS
40.4% of plants
56.1% of total capacity
49.7% of employes

● OKLAHOMA
13.5% of plants
7.5% of total capacity
11.5% of employes

● LOUISIANA
7.9% of plants
10.4% of total capacity
9.5% of employes

● CALIFORNIA
13.7% of plants
14.0% of total capacity
12.9% of employes

PERSONNEL BREAKDOWN BY JOB-TITLE CLASSIFICATIONS U. S. TOTAL

In the natural-gasoline manufacturing division, manpower totals by job classifications are (U. S. total):

Job title—	Total No.	Job title—	Total No.
Plant Supts.	485	Tank-car loaders	236
Assistant Supts.	181	Firemen	714
Chief chemists	112	Oilers	929
Chemists	266	Stillmen	798
Engineers	628	Chief clerks	295
Maintenance Supts.	163	Field-gas men	454
Maintenance Men	982	Roustabouts	2,119
Chief operators	386	Others	2,548
Operators	2,872		
Transport loaders	247	Total	14,415

ANNUAL

Natural-Gasoline SECTION

THE OIL AND GAS JOURNAL

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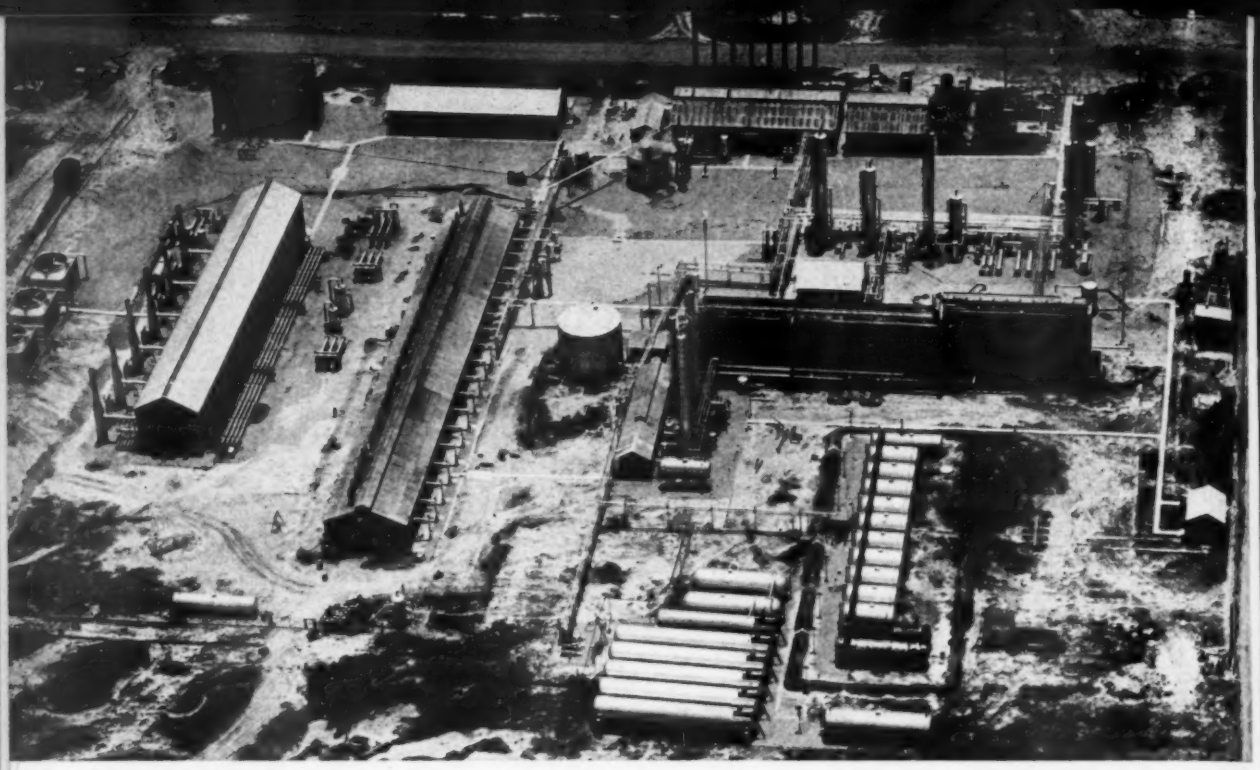
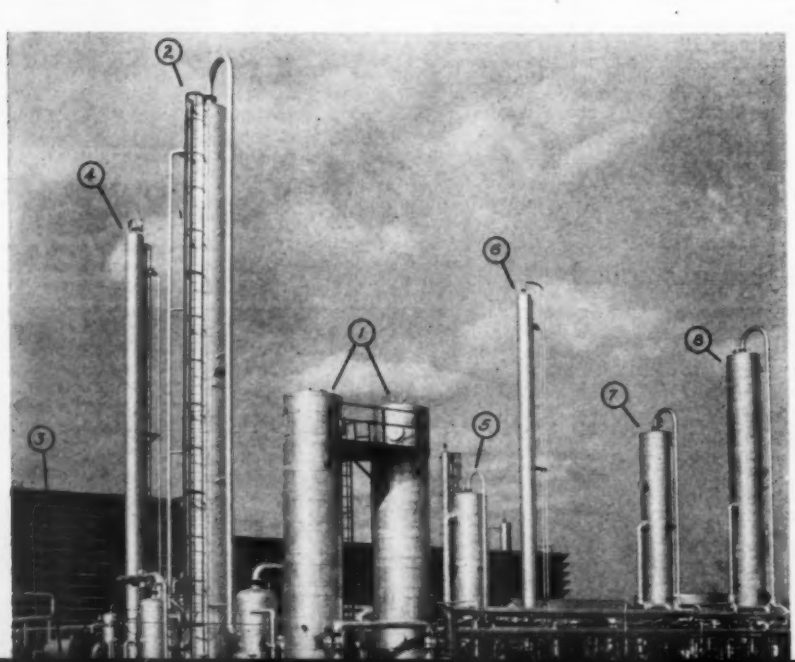


This aerial photograph of Midland Gasoline Co.'s natural-gasoline plant in Montgomery County, Texas, taken prior to its completion, shows the general equipment layout as viewed from the north.

Midland's Conroe Gasoline Plant

Plant has continually met or exceeded design capacities and smooth operations have been obtained. High propane recovery has been achieved while the gas volume and gas content varied widely from design conditions.

by Calvin C. McKee* and Charles W. Miller*



MIDLAND GASOLINE CO.'s plant is located in Conroe oil field 7 miles southeast of Conroe, Montgomery County, Texas. The gas processed is from 471 of the 882 oil and gas wells in the field. This field was discovered in 1931 (G. W. Strake's No. 1 S.T.D.), and its major development was completed by 1936. With production from both the Conroe sand (Yegua series) and Cockfield sand,[1] the field covers 18,057 acres. Current oil production is from 768 wells producing 37,000 bbl. daily from the Conroe sand, and 70 wells producing 1,233 bbl. daily from the Cockfield sand.[1] Cooperation and exchange of information by the producers, through the Conroe Operators Association, has resulted in orderly drilling and production methods which should insure the field of maximum life and a high percentage of oil and gas recoveries. Conroe field has produced 281 million barrels of oil with estimated reserves of 358 million barrels.[1]

The original plant was installed in 1933 as a well-pressure operation, and

*Midland Gasoline Co., Conroe, Tex.

Absorption and distillation section of Midland Gasoline Co.'s plant, near Conroe. (1) Dehydration unit. (2) Main absorber. (3) Rich-oil flash tank. (4) High-pressure reabsorber. (5) Rich-oil stripper. (6) Low-pressure reabsorber. (7) High-pressure still. (8) Low-pressure still.

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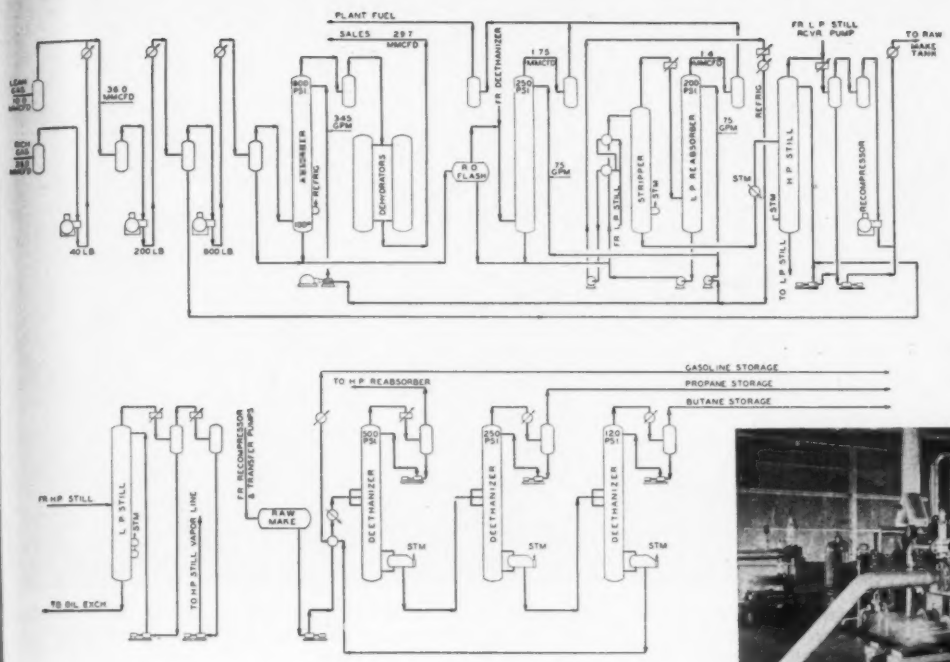
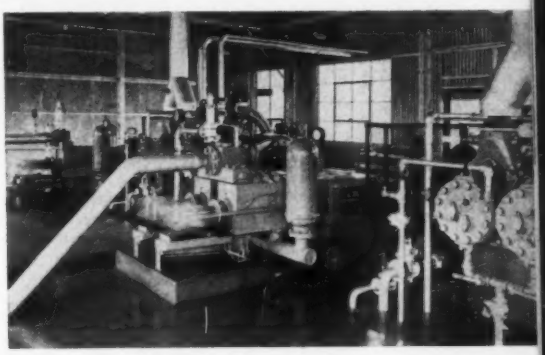


Fig. 1—Design flow arrangement of Midland's Conroe plant.



***Below:** Gas-engine powered, these two pumps in absorption-oil service are rated at 250 g.p.m. Housed in the same building with the pumps are the plant's gas-engine-driven electrical generators. A fire wall separates the generators from the pump room.*

was progressively enlarged until in 1948 it had 4,185 compressor horsepower compressing 21,600 M.c.f. per day of vacuum gas to 50 psig. In addition to the vacuum gas 11,000 M.c.f. per day of well-pressure gas entered the plant at absorber pressure to produce an average total of 40,000 gal. per day of propane, butane, and natural gasoline.

A survey in 1948 indicated a high-pressure absorption system would be economically feasible because of the value of the high-pressure residue gas and L.P.G. products and would comply with current gas-conservation requirements.

The proposal and flow sheet (Fig. 1) for the plant design and erection, submitted by Gasoline Plant Construction Corp., was accepted and work began in December 1948, to install the additional equipment to process 36,000 M.c.f. per day at 800 psig. with a recovery of 75 per cent propane in storage. The major items of equipment installed were: 7,200 compressor horsepower, aerial coolers, absorbers, gas dehydrators, distillation units, debutanizer, induced-draft cooling tower, gas-engine driven electric generators, and additional butane and propane storage.

Available space in and adjoining the plant site permitted installation of the new equipment while continuing to operate the existing plant. The cost of high-pressure oil coolers was avoided by using the old lean-oil pump to discharge through the existing low-pressure oil coils and chiller to the suction of the new high-pressure main oil pumps. Two main absorber intercoolers were installed to advantageously utilize the existing 375-hp.-butane refrigeration system.

Capacity of the field system was increased by adding 10 miles of pipe ranging in size from 12 to 20 in. and by relaying 10 miles of pipe ranging in size from 4 to 10 in.

First-Stage Compression

The first-stage compressors consist of 17 units totaling 3,810 hp. Gas at the rate of 33,000 M.c.f. per day is compressed in this stage from 7 in. of Hg vacuum to 40 psig., and cooled from 270° F. to 95° F. with 85° F. water in three parallel 970-sq.-ft. shell-and-tube exchangers. A recent analysis of this vacuum gas is:

	Mol per cent
C_1	84.93
C_2	6.95
C_3	3.82
iC_4	0.79
C_4	1.34
iC_{5+}	2.17

Second and Third-Stage Compression

Six 1,200-hp. engines furnish power for the second and third stages of compression. After being cooled and scrubbed, gas from the first stage is combined with 7,000 M.c.f. per day of

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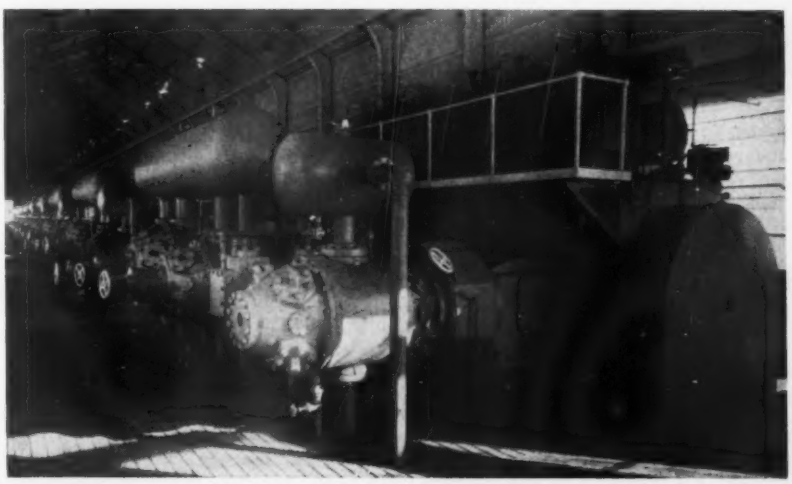

Six 1,200-hp. gas-engine-driven compressors are installed in the compressor building at Conroe. Each engine serves two second-stage and two third-stage compression cylinders.

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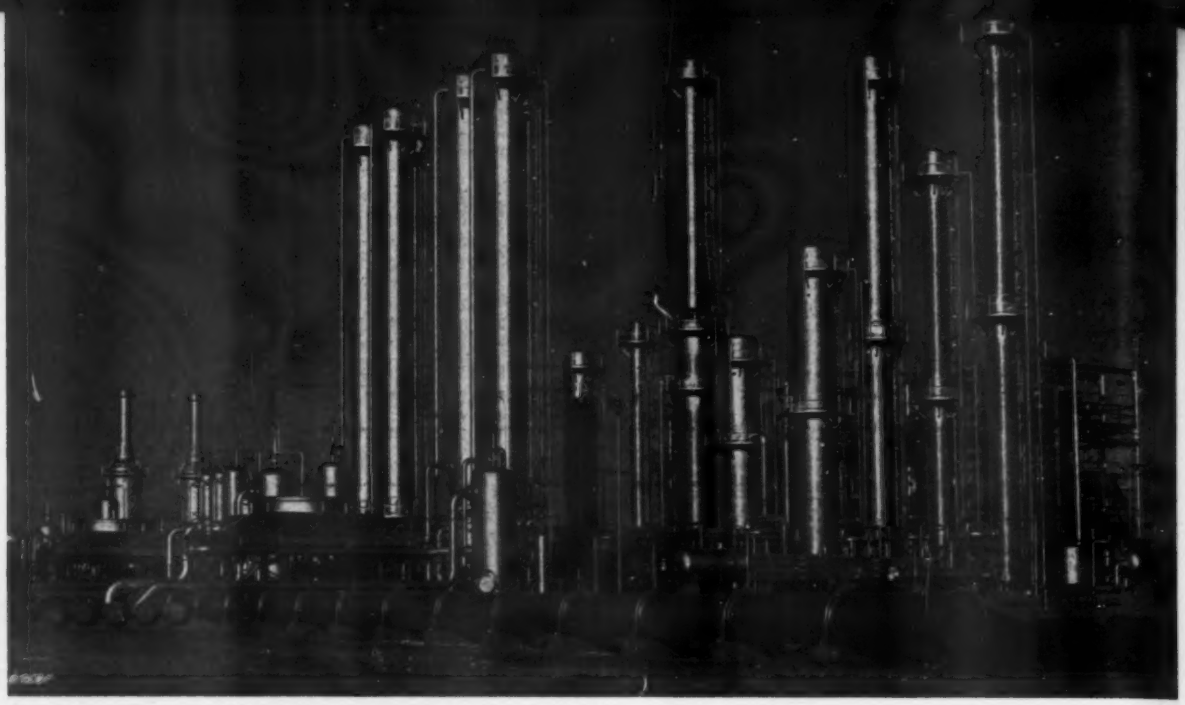


The processing section of Gulf Oil's Eunice natural-gasoline plant. An average of 58,000,000 cu. ft. per day of natural gas is handled by the plant to produce nearly 150,000 gal. daily of liquids. With the aid of high-pressure absorbers operating at 850 psig. and refrigeration, propane extraction is in the range of 90 per cent.

Gulf Oil's Plant at Eunice, N. M., Completing 2 Years of Operation

High propane extraction, air cooling feature recently enlarged plant

by H. T. Griffin* and John Hoover†

NOW completing its second year of operation, the Eunice gasoline plant of Gulf Oil Corp. is located immediately adjacent to the town of Eunice, Lea County, in southeastern New Mexico. This part of the Permian basin has shared in the rapid development taking place in West Texas and New Mexico and the Eunice plant is one of two large and modern installations Gulf Oil has recently placed in operation, the other being its Waddell plant, 35 miles southwest of Odessa, Tex.

Modern in every respect, the absorption and process facilities were designed to handle a maximum of 55 to 60 million standard cubic feet per day of separator gas that was formerly flared on the producing leases. The recent installation of 4,800 additional horsepower of compressor capacity has increased the average throughput to 58,000,000 standard cu. ft. per day. High absorption pressure and refrigeration of the absorption oil permits recovery of approximately 90 per cent of the propane from the incoming gas streams.

Under representative conditions, it is expected that production will average 48,000 gal. per day of 20-lb. R.v.p. natural gasoline, 27,000 gal. per day of commercial butane, and 68,000 gal. per day of commercial propane. The residue gas, sweetened to less than ¼ grain of hydrogen sulfide per 100 standard cu. ft. and dried to less than 6 lb. of water vapor per 1,000,000 standard cu. ft. is delivered into utility-company pipe lines for transmission to California. Since residue gas is delivered at 850 psi., part of it could be utilized for gas lift or other requirements of the oil-producing operations.

Connected to 315 Wells

The plant is connected to 315 oil wells producing from Arrowhead, Blineberry, Brunson, Drinkard, Hardy, Hare, McCormack, Paddock, and Penrose-Skelly pools. Since the gas produced from each formation under each lease is measured separately, it is necessary to operate 115 meter stations. Hydrogen sulfide content of the produced gas varies from 0 to 400 grains per 100 standard cu. ft. with plant intake averaging 100 grains. The gas is gathered through 55 miles of lines, the largest of which is 24-in. diameter. The gathering system was designed for a 3-psi. pressure drop from the farthest point to the plant. Condensate receivers (drips) were installed ahead of each meter and at all low points in the system. Design of the system was by Gulf's engineering department.

Ground was broken in August 1948 and in May 1949 the compressor plant started delivering raw gas to the utility company. During August 1949 the absorption and processing equipment was placed on stream.

The engine room is located on the south part of the plant site together with the air-cooled jacket water coolers, jacket water pumps, etc. The amine contactors, the absorbers, dryers, interstage coolers, scrubbers, etc.,

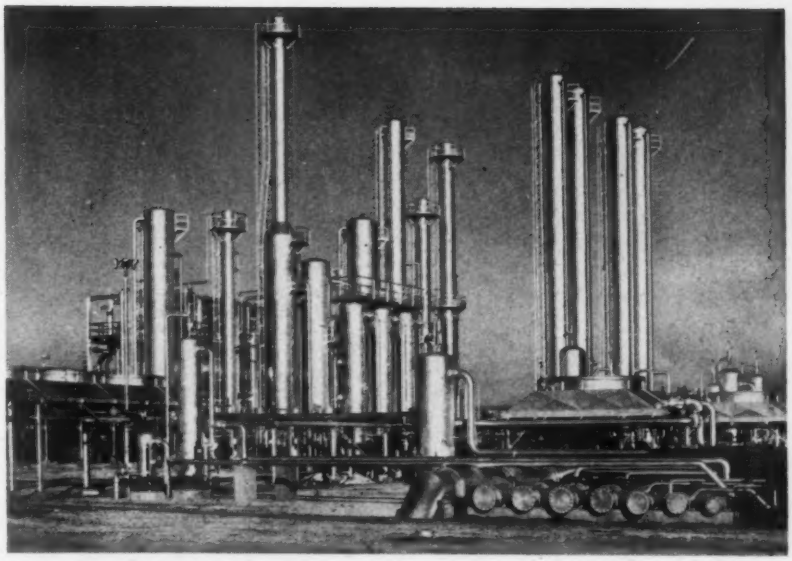
*Superintendent and †plant engineer, Gulf Oil Corp., Eunice, N. M.

are in an east-west line immediately north of the engine room. Stripping equipment, fractionators, amine reactivator, absorption-oil chillers, air-cooled oil coolers are in the next line north. Coolers, condensers, and surge tanks are located on an equipment structure with the coolers and condensers on the top deck and the surge tanks on the second deck. This arrangement provides flooded suction on the pumps as well as a compact side-by-side arrangement of the fractionating equipment. Oil and amine pumps are located in the west room of the pump house and fractionating pumps in the east room with controls in the middle room. The cooling tower is on the north line.

Boilers, generators, fired heaters, water-treating equipment, water-storage auxiliary pumps, and a shop are on the west side of the site and product storage vessels on the east. The railway loading rack is outside the fence on the east and truck-loading facilities are outside the fence north of the storage area. Office and laboratory are in the northwest corner of the site.

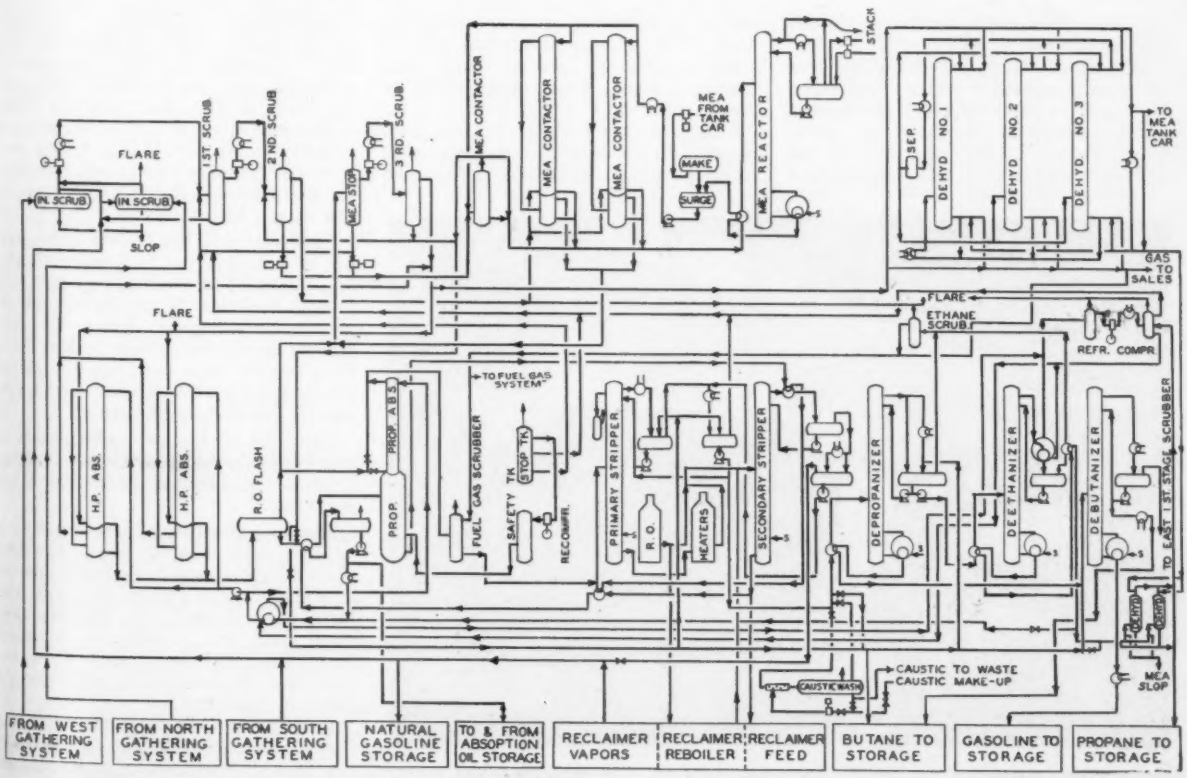
All plant buildings are steel-frame, corrugated Transite construction and interior walls and machinery are finished in modern colors designed to reduce eye strain and promote safety. Exterior insulation is covered with aluminum jacketing.

The original compressor installations contained nine 1,200-hp. units.

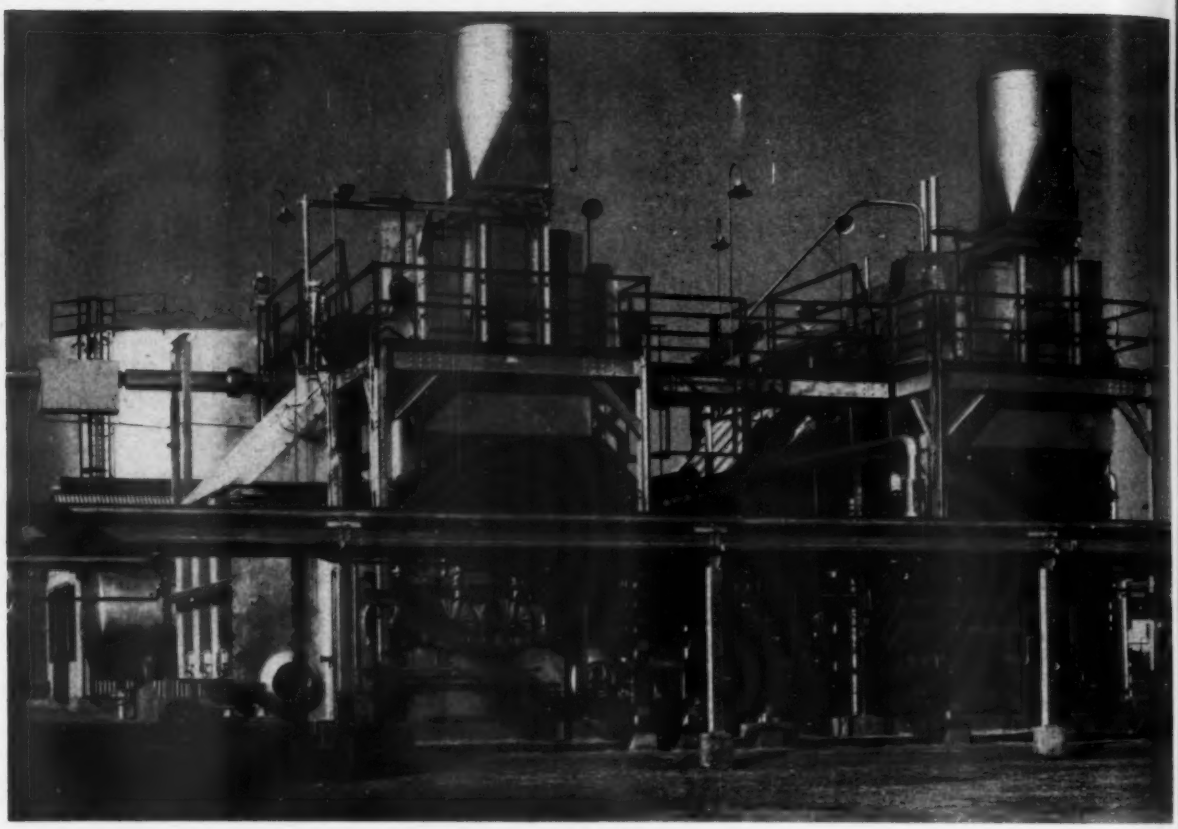


This view of Gulf Oil's Eunice natural-gasoline plant shows the suction and discharge gas headers in the foreground. The three short vessels topped with a platform, which may be seen in center foreground, are activated alumina dryers for residue gas.

Five of the units have a cylinder in either refrigeration or recompressor service. Three recently installed 1,600-hp. units bring the total rated horsepower to 15,600. All units operate in parallel and compress gas in three stages. To prevent producing vacuum on the field lines and thus introduce corrosive oxygen, they are equipped with speed controls. First and second-stage cylinders are equipped with hand-adjustable clearance pockets. Twelve air-cooled units with horizontal two-speed fans provide water for jacket and oil cooling. Boiler condensate is used as makeup. The engine room is provided with forced-draft blowers which greatly reduce the temperature as well as decrease the amount of sand and dust which



Simplified flow scheme of the Eunice natural-gasoline plant operated by Gulf Oil Corp. in Lea County, New Mexico.



Steam for Eunice plant operations is supplied by these two Wickes, two-drum, water-tube units which operate at 275 psig. and 600° F. total temperature.

could be blown in from the surrounding desert-like country.

Electrical energy for the plant and for pumping water wells is provided by two turbine-driven generators, each capable of carrying the plant load. These turbine operate against a back pressure of 3 psia. Condensing surface is provided by four air-cooled units. This arrangement has proved quite satisfactory and the units also condense steam from other parts of the plant.

Steam for the turbogenerators, mechanical-drive turbines, process, and other purposes is provided by two three-drum, superheater, bent-tube boilers each rated at 60,000 lb. per hour of steam and each capable of carrying the plant load. They are operated at 275 psig. and the steam is delivered at a total temperature of 600° F. An adjustable baffle permits the temperature to be controlled to the desired figure regardless of the steam load.

Feed water to the boilers is deaerated in a tray-type feed-water heater and make up is provided by an evaporator designed to produce 8,500 lb. per hour of water vapor. To date scaling problems in the boilers have been nonexistent and very nominal treating is required. Boiler feed-water pumps are turbine driven.

The rich-oil heater unit consists of two vertical gas-fired furnaces having a total capacity of 29,000,000 B.t.u. per hour.

The two absorbers operate in parallel and each has 30 trays. The two monoethanolamine contactors operate in parallel, each having 24 trays. The MEA reactivator is stainless-steel lined and the reboiler is stainless lined with stainless tubes. Examination has indicated no corrosion to date in this unit.

Rectification equipment includes a rich-oil demethanization and reabsorber unit, two strippers, depropanizer.

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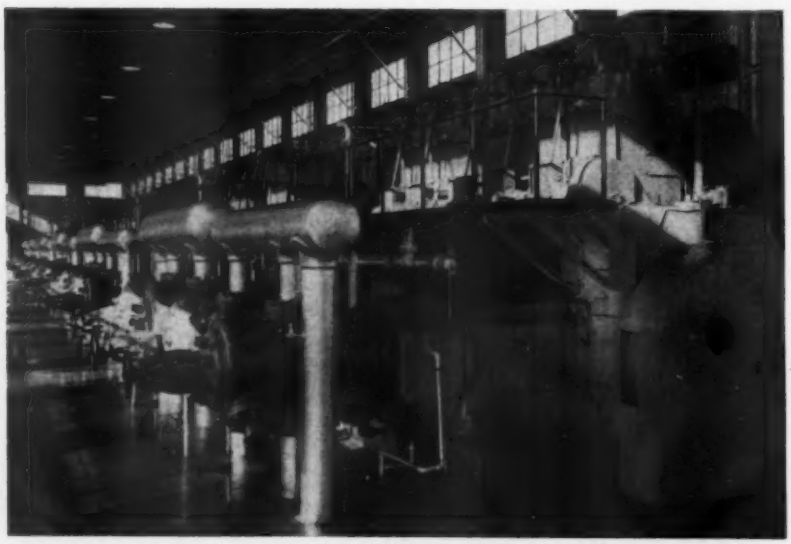
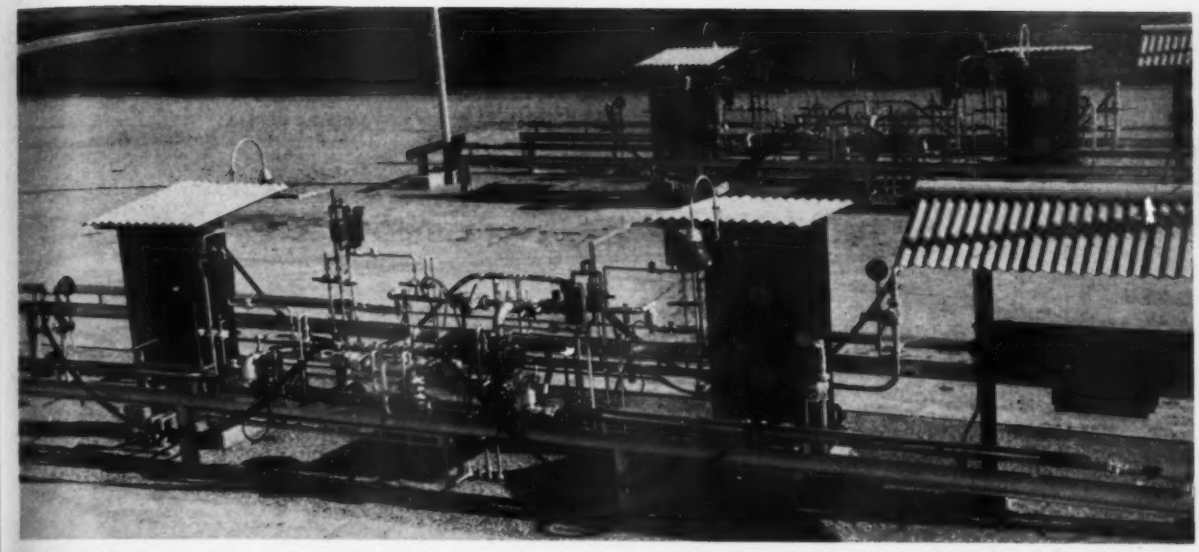


Compression equipment at the Eunice plant totals 10,800 hp. Five cylinders in this battery of nine compressors serve in recompressing and refrigeration.



Tank-wagon loading dock at Richfield Oil Corp.'s South Cuyama plant. Complete safety and high-speed loading go hand in hand in the design of this loading dock.

"Make it safe and make it fast-loading!" These were the orders followed in designing

Richfield's Cuyama Valley L.P.G. Loading Racks

by M. L. Arnold*

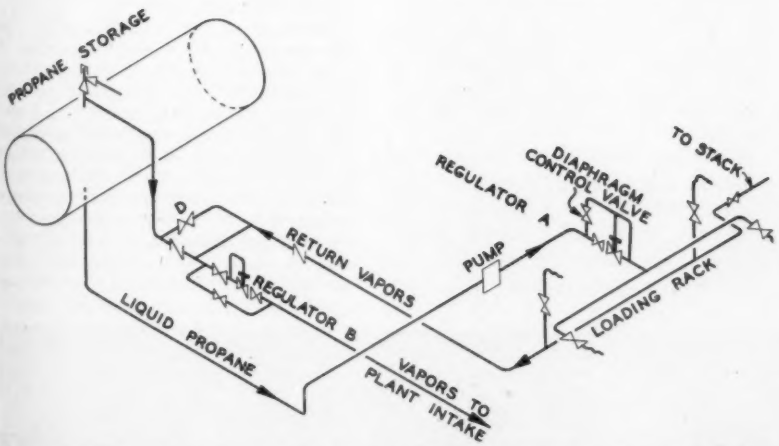


Fig. 1—Flow layout of the original design for Richfield's South Cuyama plant loading facilities.

MAKE it safe and make it fast-loading!" That was the essence of the instructions management gave the engineering department when Richfield Oil Corp. decided recently to install facilities for loading L.P.G. into tank trucks at its two plants in the Cuyama Valley.

"We want our employes and those of our customers to be thoroughly protected against failure of mechanical equipment or human error while loading is in progress," they said. "Furthermore, our customers have thousands of dollars invested in their tank trucks. These are not making money for them while waiting to be loaded, so design the facilities to get the trucks loaded and back on the road again in the shortest possible time. And give some thought also to the comfort of the truck driver while he is waiting."

When the installation was completed a few months later, the engineers were happy to hear the favorable comments of management, customers, and operating personnel. Customers are pleased with the installation because they are able to pull on the rack and be on their way again in 30 to 45 minutes, depending upon the size of their outfit. And they know that their equipment and drivers will be given every practicable protection while loading is in progress.

Loaders like the rack because it is simple to operate. They like the safety features, too. Loading pumps can be stopped and the emergency shutoff valve on the loading line closed simply by operating a conveniently located push button. And, just a slight drop in loading pressure, such as might be caused by a small rupture in a loading hose, causes the emergency shutoff valve to close. Moreover, they are protected against possible accidents resulting from their own possible careless acts. For example, if the loading valves are opened but one hose is left uncoupled, or loosely coupled, the rack cannot be placed in operation.

Management is pleased because of the customer and employe satisfaction that has resulted from the installation.

As the first step in carrying out management's instruction, the engi-

*Chief engineer, Gas Division, Richfield Oil Corp., Los Angeles.

neers reviewed the difficulties which had been experienced with previous installations. The first of these had been the relatively simple installations shown diagrammatically in Fig. 1. It was designed for the loading of propane. The three pumps were electric-motor driven and had a capacity of 100 g.p.m. each at a head of 40 psig. The principal safety feature was the regulator A. Its function was to close in case of the rupture or failure of one of the liquid loading hoses. It was a normally closed motor valve.

In the rack's operation, as soon as the loading hoses had been connected to the tank truck, block valve opened and the pumps started, the control valve to the diaphragm of regulator A was opened. This caused regulator A to open and started propane flowing through it to the tank truck. As soon as sufficient pressure was developed downstream of the regulator, the control valve to the diaphragm was closed. With the control valve closed, the regulator remained wide open only so long as the downstream pressure exceeded the set pressure of the regulator. It closed completely if the pressure dropped 25 psig. below the set pressure. Thus, the flow of propane was automatically stopped in case of the failure of one of the loading hoses.

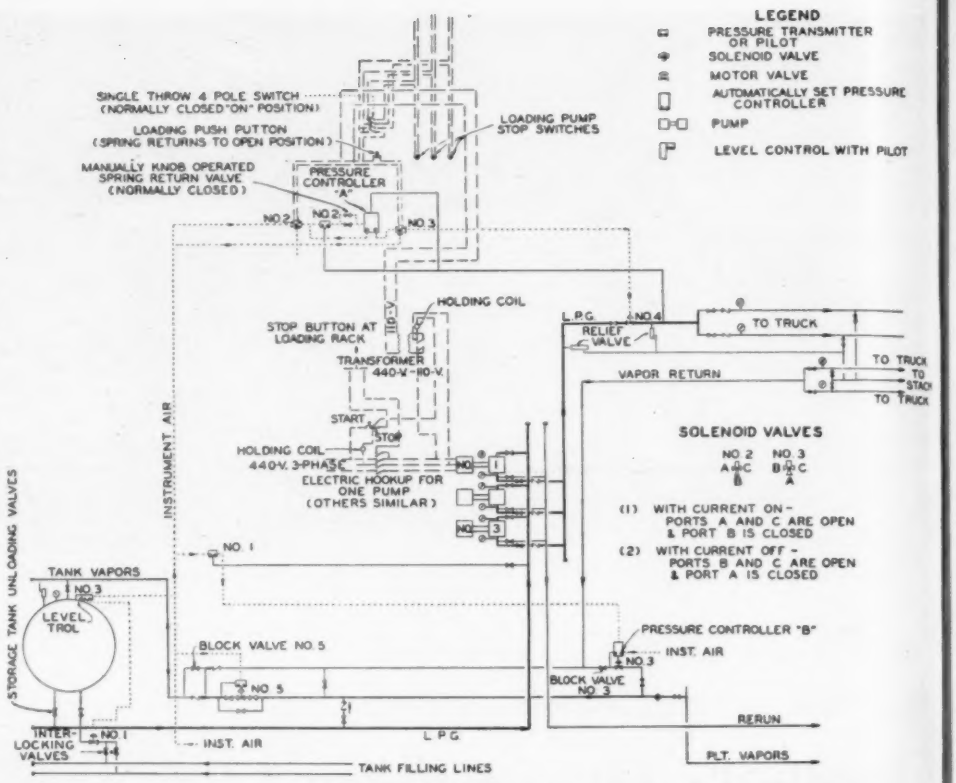
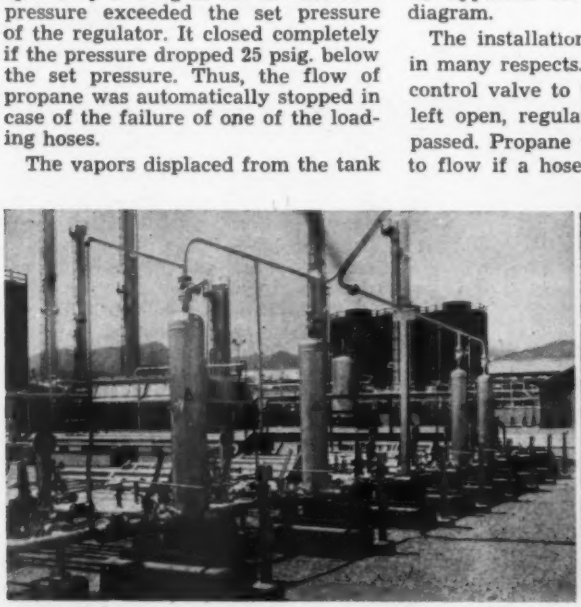


Fig. 2—Piping and controls diagram of the South Cuyama plant's L.P.G. loading system.

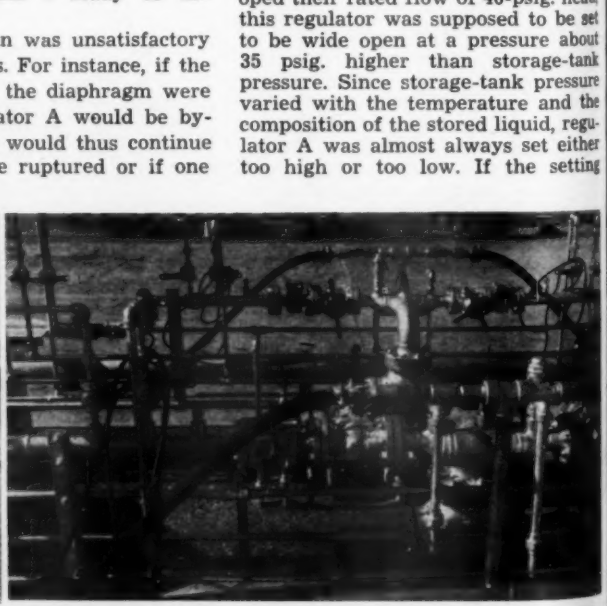
The vapors displaced from the tank truck during loading were normally returned to the storage tanks if of the same composition as the product being loaded. Otherwise, Valve D was closed and the vapors taken into the plant intake through regulator B. Other features of the installation will be apparent from a study of the diagram.

The installation was unsatisfactory in many respects. For instance, if the control valve to the diaphragm were left open, regulator A would be bypassed. Propane would thus continue to flow if a hose ruptured or if one of the loading valves should accidentally be opened before being connected to the tank truck.

Another source of difficulty was the necessity of setting regulator A to be wide open above some particular pressure. Since the pumps developed their rated flow of 40-psig. head, this regulator was supposed to be set to be wide open at a pressure about 35 psig. higher than storage-tank pressure. Since storage-tank pressure varied with the temperature and the composition of the stored liquid, regulator A was almost always set either too high or too low. If the setting



This battery of pumps serves the tank-wagon loading dock at the South Cuyama plant. Operation of the pumps is controlled from the L.P.G. loading dock.



Control equipment at dock. Heart of system is a normally closed motor valve controlled by an instrument-type pilot, with automatic set and low-pressure limit stop.

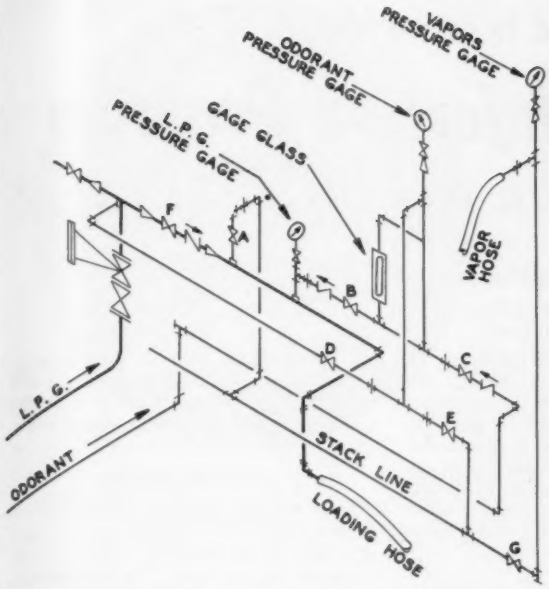
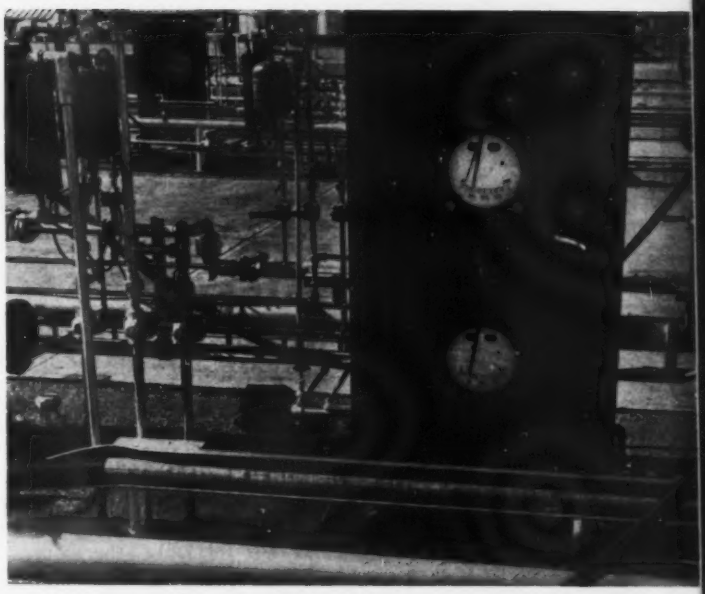


Fig. 3—Isometric layout of L.P.G. deodorizing system operated by Richfield Oil Corp. at its South Cuyama plant.



One of four control boards at rack. Loading pumps may be stopped or emergency cutoff valves may be push-button operated.

were too high, the pumps delivered less than their rated capacity and might even be shut off. If the setting were too low, little or no protection was given against anything less than a complete rupture of the loading hose.

Similar difficulty was experienced with regulator B when truck vapors were taken to the plant intake. The regulator was ordinarily set to open at a pressure of 200 psig. In the wintertime, when the pressure in the storage tanks might drop to 145 psig., this was above the shutoff head of the pumps. If the set pressure of the regulator were dropped to increase the delivery rate of the pumps under this condition, excessive losses of vapors occurred during warm weather if the regulator were not set up again.

In the next installation regulator A was replaced with a pneumatically operated, differential pressure-controlled valve. It closed automatically if the pressure drop across it became excessive, as would be the case in the event of a hose failure.

The only trouble experienced with this type of control occurred when a truck arrived with little or no pressure on its tanks. Under this circumstance, the differential pressure existing between the storage tank and the tank-truck created such a high rate of flow that the differential control valve would close. To avoid this, a means was provided later for equalizing the pressures in the storage tanks and the tank truck before loading started. This avoided the difficulty which had been experienced with the differential control valve, but it increased the time of loading.

When design was started on the Cuyama installation it was decided to take advantage of this high initial differential pressure to reduce loading time. A search was started for a type of safety control which would not shut off under this high flow rate, and which would also shut off quickly in the event of a hose rupture. We finally settled upon the use of a normally closed motor valve controlled by an instrument-type pilot of the automatic-set type with a low pressure-limit stop.

The instrument chosen was a Brown adjustable Indexit pressure controller. It is controller A of Fig. 2. It is automatically set by transmitter No. 2 for a pressure sufficiently lower than that existing downstream from motor valve No. 4 so that normal fluctuations in pressure will not cause a shutdown. The output line of trans-

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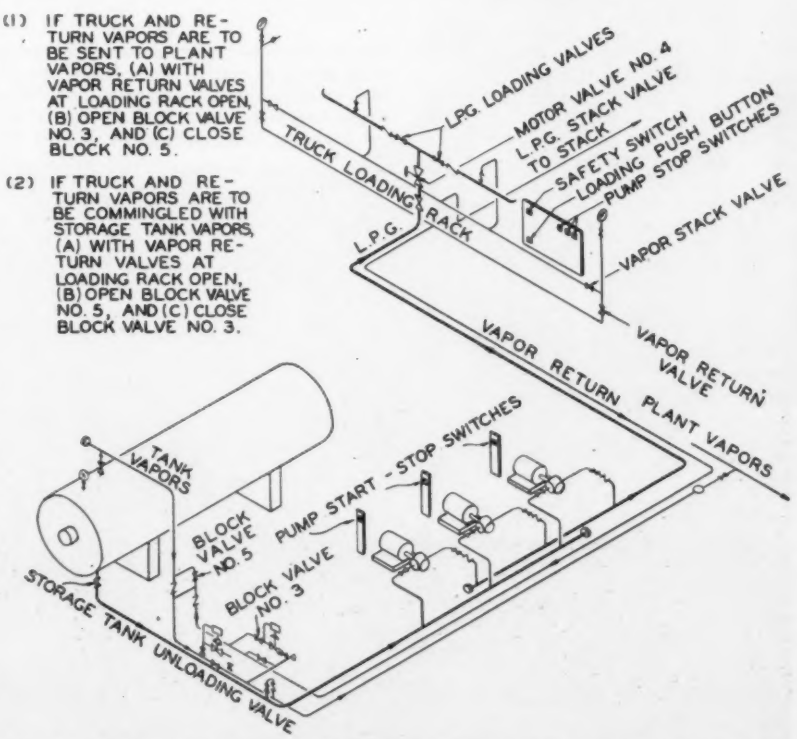

(1) IF TRUCK AND RETURN VAPORS ARE TO BE SENT TO PLANT VAPORS, (A) WITH VAPOR RETURN VALVES AT LOADING RACK OPEN, (B) OPEN BLOCK VALVE NO. 3, AND (C) CLOSE BLOCK NO. 5.
(2) IF TRUCK AND RETURN VAPORS ARE TO BE COMMINGLED WITH STORAGE TANK VAPORS, (A) WITH VAPOR RETURN VALVES AT LOADING RACK OPEN, (B) OPEN BLOCK VALVE NO. 5, AND (C) CLOSE BLOCK VALVE NO. 3.
LPG. LOADING VALVES
MOTOR VALVE NO. 4
L.P.G. STACK VALVE TO STACK
SAFETY SWITCH
LOADING PUSH BUTTON
PUMP STOP SWITCHES
TRUCK LOADING RACK
L.P.G.
VAPOR STACK VALVE
VAPOR RETURN VALVE
VAPOR RETURN PLANT VAPORS
TANK VAPORS
BLOCK VALVE NO. 5
PUMP START - STOP SWITCHES
BLOCK VALVE NO. 3
STORAGE TANK UNLOADING VALVE

Fig. 4—This isometric drawing of the piping for Richfield's L.P.G. loading facilities is used with written operator instructions.

XUM

Block 31 pressure-maintenance plant believed to be world's

Highest-Pressure Gas-Injection Program

Injects 8,000,000 cu. ft. of gas daily at about 4,100 psi.

by Roy F. Carlson
West Texas District Editor

THE Block 31 pressure-maintenance plant being operated by Atlantic Refining Co. for itself, Phillips, Champlin, and Continental is at least one of if not the highest-pressure gas-injection programs in existence. In this plant, about 8,000,000 cu. ft. of gas at about 4,100 psi., is being injected daily, after being compressed from field pressures of both 7 and 120 psi. This gas is injected into the field through two injection wells. The plant serves the 72 producing-well Block 31 field.

The plant was designed expressly as a pressure-maintenance plant, although incidental to the compression and drying of the injection gas 300 bbl. of liquid products is produced daily. The liquid product now consists of 35-lb. R.v.p. natural gasoline taken from a single stabilizer tower after being scrubbed from the gas by high-pressure separators.

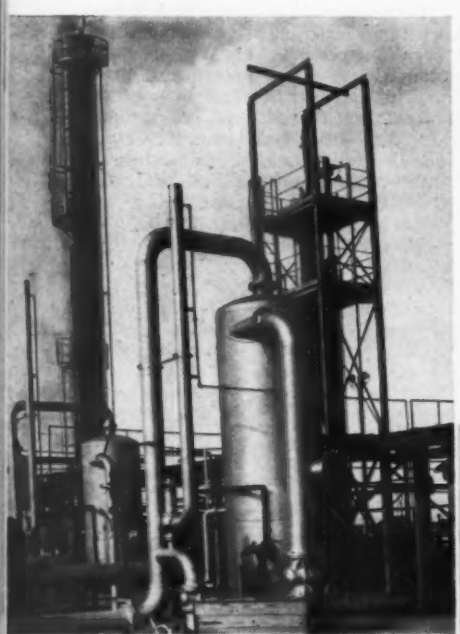
Compression of the gas is carried on in either three or four stages, depending on the supply pressure from the field. In the four stages used to compress the gas supplied at 7 psi. the pressures are 50 to 55 psi. in the first stage, about 260 psi. in the second, 1,100 psi. in the third, and the final stage of 4,000 to 4,100 psi. Two 800-hp. compressors are used in this system.

A three-stage unit takes field gas that is supplied at about 100 psi. compresses it to 350 psi. in the first stage, 1,100 psi. in the second, and to 4,100 psi. in the third stage. One 800-hp. unit is used in this service. All of the compressor suction for the final stage is taken from a common header, all the gas being mixed after compression to 1,100 psi.

Plant Processing

After each stage of compression except the final one, all gas is sent through an intercooler and a gas-oil separator or scrubber. A precautionary separator is also placed in the gas stream ahead of the compressors to prevent any liquid from entering the primary cylinders.

After the 1,100-psi. stage, all the gas is treated in dry-type dehydrator towers. These dehydrators are of the packaged kind, with two towers and auxiliaries being mounted on a skid. One of these units is on stream at all times, while the other is being reactivated. A horizontal high-pressure separator is placed in the fluid stream just ahead of these dehydrators to knock out any entrained liq-



Left: In this view of a portion of the pressure-maintenance plant, operated by Atlantic Refining Co. in Block 31 field, Texas, are shown the stabilizer column in left background, DEA treater in right background, and the separators for various stages of compression. Below: This view of the Block 31 plant shows the compressor building, right, and the control house in center foreground. Directly behind the control house is the DEA unit and to the right is the stabilizer column.

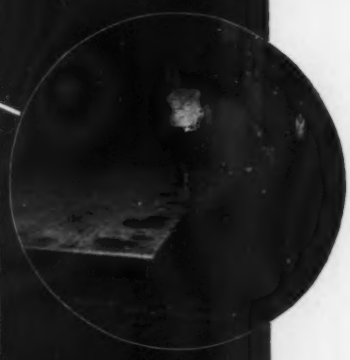
What to look for when you consider buying a tower

Did you ever try putting yourself "in the other fellow's shoes" when buying equipment? By doing so, you might discover some interesting reasons why some supplier's quotations are higher than others.

Takes a refinery tower, for instance. The accompanying illustrations show some of the operations involved—from laying out the plates to the completed job. From them, you can deduce that the quality of such a structure depends on (1) the fabricating equipment in the plant, (2) the skill of the workmen, and (3) the company's knowledge in the field.

These three assets are the important things to look for in buying a tower. As proof that it has them, we offer more than fifty years of steel plate fabricating experience. Why not "consider" our services the next time you need a steel plate structure?

This view shows layout men marking the plates for a 15 ft. diam. by 90 ft. vacuum tower.

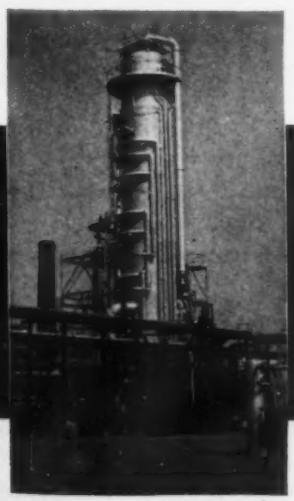


Part of the tower was made from alloy-clad plates. This view shows the cladding being chipped back so the carbon steel weld will not be contaminated during welding.

When the plates for each ring of the shell are rolled to the proper radius, the ends are tack welded manually. The welds themselves are made on automatic machines.

Below: A workman is shown preparing the edge of the bottom head for welding to the adjoining shell ring.

Left: View of the completed vacuum tower in an Ohio refinery.



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Chicago, 4.....2128 McCormick Bldg
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3...1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
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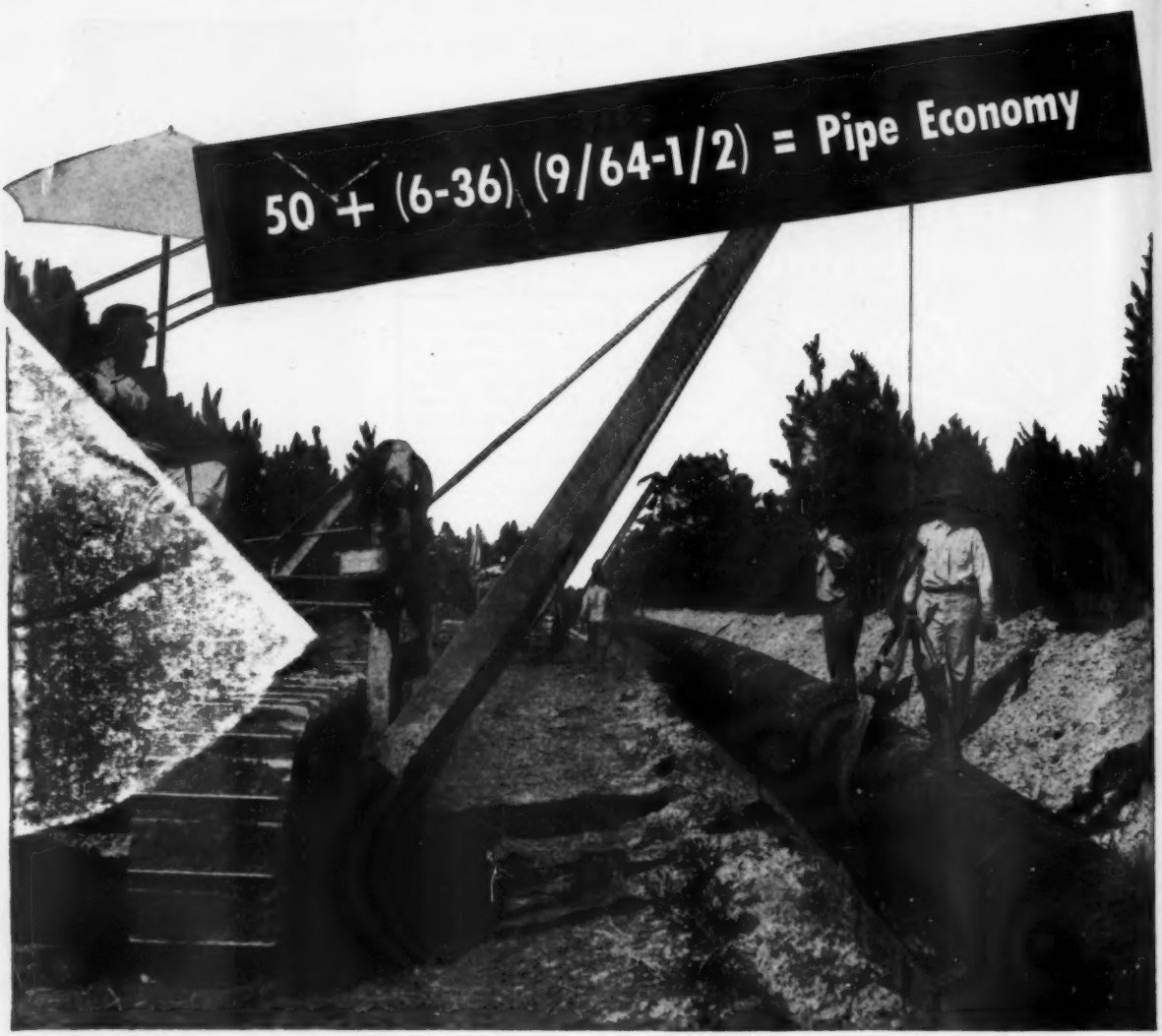

Try this equation for economy on that next line pipe job.

Take the installation economies of mill lengths up to 50 feet.

Add the savings in metal gained by matching exact job requirements from the wide range of diameters (6 to 36 inches) and wall thicknesses (9/64- to ½-inch).

Then you'll discover why more and more oil and gas men are specifying Armco Welded Steel Pipe for pipe lines, gathering systems and other needs. Jobs are done faster and costs are less.

Besides economy, Armco Steel Pipe also provides exceptional strength and flexibility. It has a high safety factor against internal and external pressures. Cold bends and slack loops are no problem.

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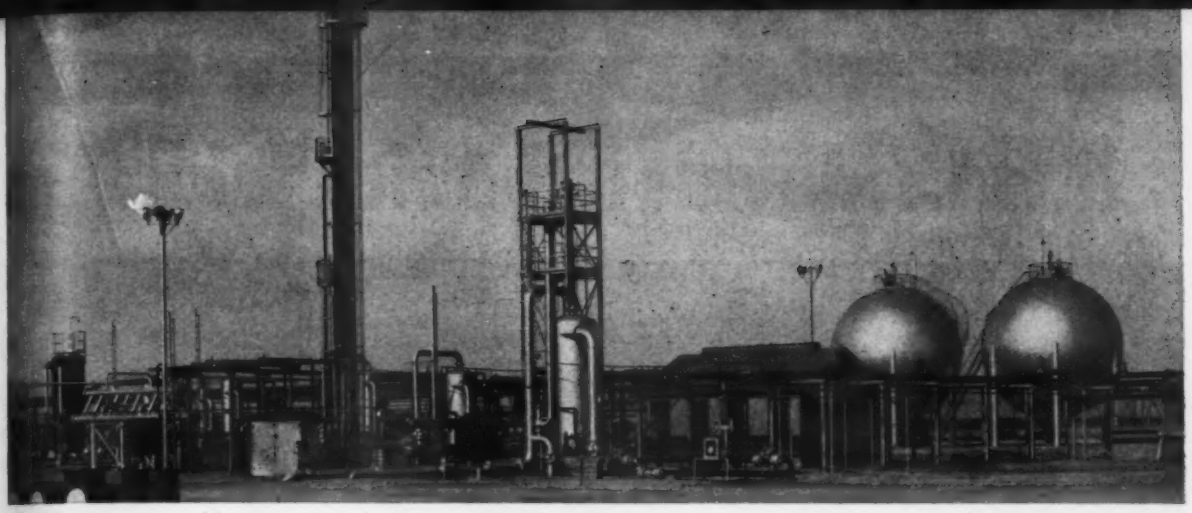


General view of the processing area of Block 31 plant. Product-storage spheres are located to right of the plant's control house.

uids. From the dehydrator the gas goes to the final compression stage and then to the field injection wells.

A double-extra-heavy piping system carries this gas. All turns and joints are welded except where valving or other connections are required. At these points the line is fitted with heavy flanges. A high-pressure mist and solids extractor or separator is placed in the main supply line in the field, just ahead of the point where the line branches to go to the two injection wells. The gas is measured into each well by an orifice meter set up just ahead of the wells. The lines at each of the wells are 3-in. nominal diameter, the main line being 4 in.

Tell-tale holes are drilled into all joints of the high-pressure pipe at intervals to provide indication of dangerous corrosion in the gas system at pressures of 1,100 psi. or over. There are some additional holes drilled in lower-pressure fittings where possible corrosion from H_2S is suspected.

Any liquids removed in the scrubbers in the four-stage system before the first compression stage, after the first stage in both and four and three-stage systems, and after the second stage in the four-stage system are dumped directly into a 500-bbl. storage tank for sale via a crude-oil pipe line. Liquids taken from the other compression-stage separators are sent to the stabilizer tower.

This tower is a 30-tray unit that operates at about 400 psi. Entrances are provided at either the tenth, fourteenth, or eighteenth trays. The tower provides for reboiling and refluxing before discharging gas back to the compression system, or liquids to storage. Two spherical tanks provide storage for the product.

Fuel Gas

All plants and domestic fuel gas is sweetened in a raschig-ring-packed diethanolamine tower. Gas enters the tower at the bottom and the DEA at the top, with each flowing countercurrently through the tower. The sweet gas goes to the fuel distribution system, and the DEA goes to a stripping tower where absorbed H_2S is removed by boiling the mixture. A condenser mounted on top of the stripping tower condenses the DEA and permits the sour gas to go to a flare for burning. The H_2S absorption takes place at about 125 psi. which is the fuel-gas pressure. Stripping is done at about 10 psi.

Auxiliary Power

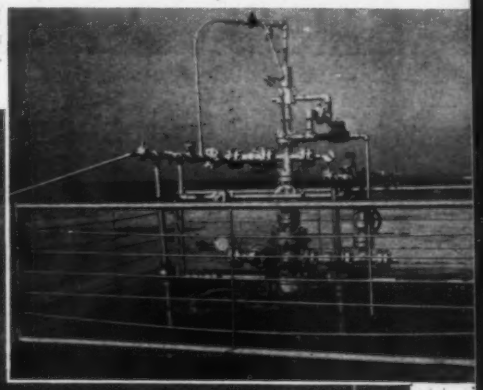
The Block 31 plant is rather unusual in that all power for auxiliaries is purchased from an electric power company. The electricity is furnished to the plant at 2,300 volts and is stepped down to 440 or 220 volts for plant use, and to 110 volts for lighting. All driving motors use three-phase current. Power is consumed at a rate of 3,500 kw.-hr. per day.

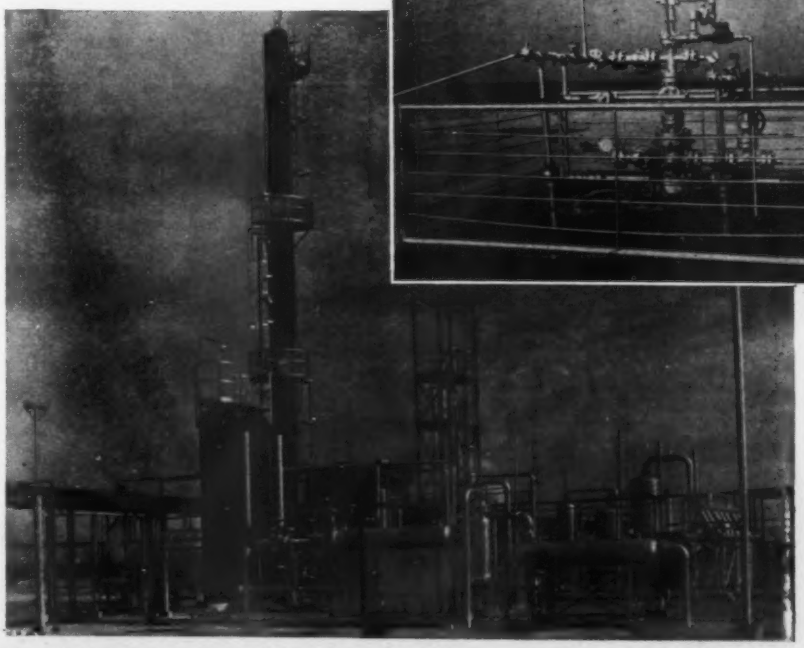
Standby power for use in case of an electric supply failure consists of parallel units powered by steam turbines on all critical equipment. To the present time, use of the steam equipment has been necessary only about 2 per cent of the time.

The turbines are either vertical or horizontal, depending on the kind of unit being driven. Automatic switches cut the turbine-powered units into service immediately in the event of an electric-supply failure. To provide for this almost instantaneous cutin, all steam equipment is kept up to

(Continued on page 220)

Right: **One of the many dually-completed wells in Block 31 field. Production is from the McKee, Ellenburger and Devonian formations.**





The skid-mounted equipment in the foreground comprises the dehydration unit for the Block 31 plant.

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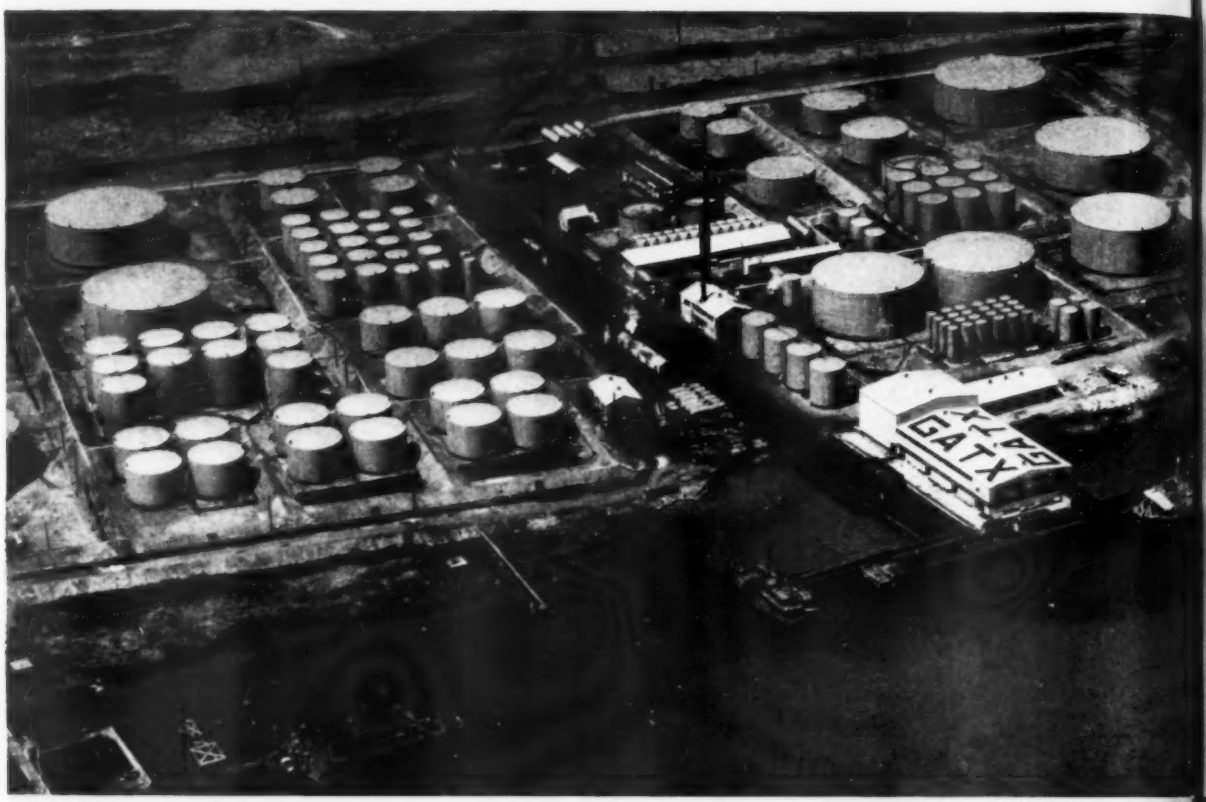

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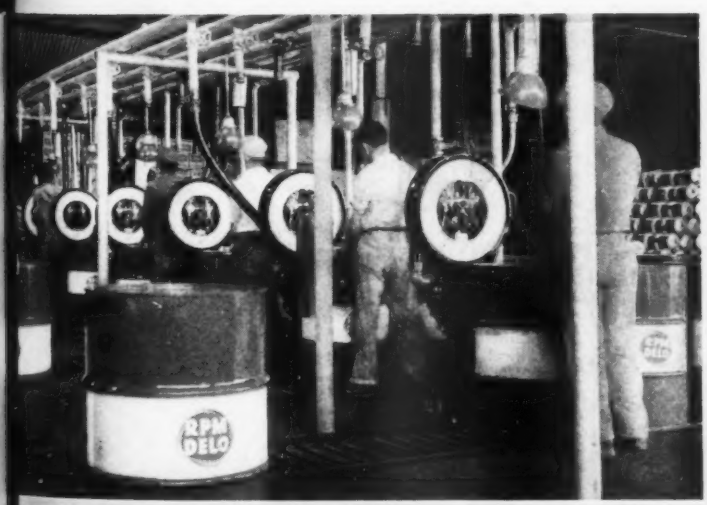

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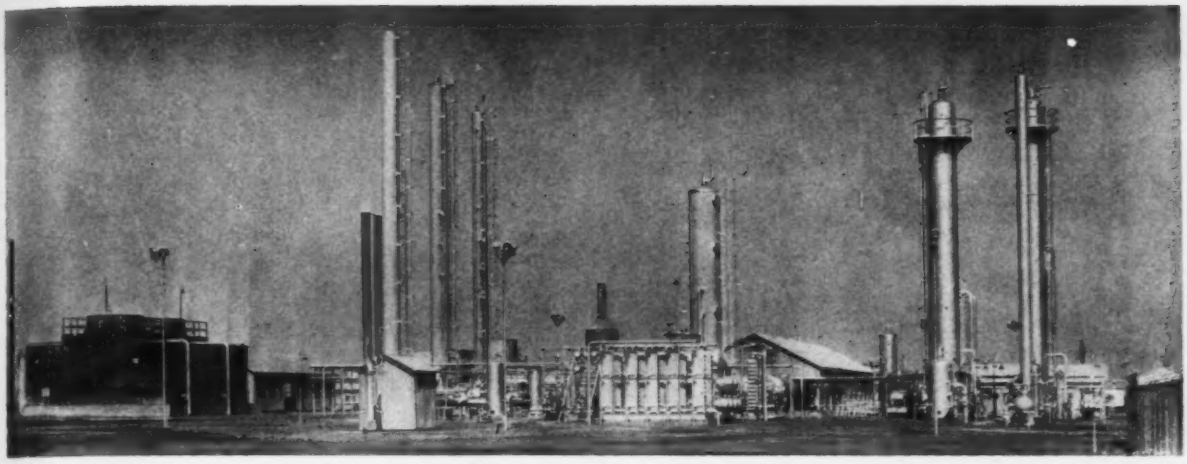


Facilities in this $1,000,000 natural-gasoline plant operated by Del Rey Petroleum Co. have recently been enlarged to include a propane-treating system.

More Treating Facilities Being Completed At Chesterville, Tex., Gasoline Plant

by F. Lawrence Resen
Gulf Coast District Editor

Throughput of plant is 40 million cubic feet per day of wet gas from which plant extracts 99 per cent of the pentanes, 95 per cent of the butanes, and 30 per cent of the propane.

INSTALLATION of a treating system to remove hydrogen sulfide from the propane system will soon be completed at the Chesterville, Tex., gasoline plant jointly owned by Del Rey Petroleum Co. and Sterling Oil & Gas Co., Houston.

This $1,000,000 plant, which was placed in operation early in 1950, has a natural-gas input capacity of 65,000,000 cu. ft. per day and serves several fields in the Colorado County section of the Gulf Coast area. Rich gas obtained from the fields is stripped at the plant and the residue gas is delivered to Tennessee Gas Transmission Co.'s system.

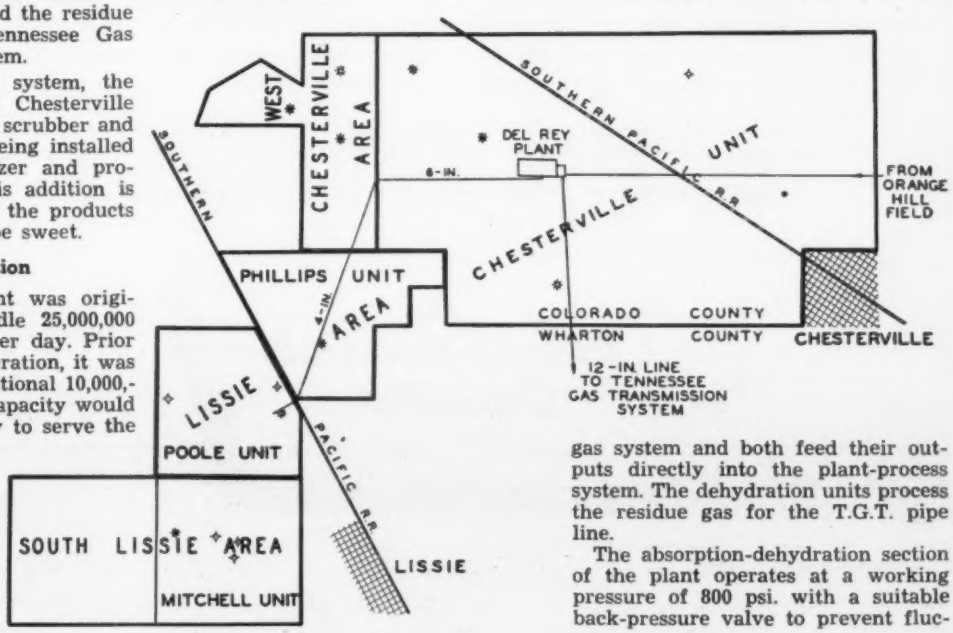
The propane-treating system, the latest addition to the Chesterville plant, includes a caustic scrubber and two driers which are being installed between the depropanizer and propane storage. When this addition is put in operation, all of the products leaving the plant will be sweet.

Other Expansion

The Chesterville plant was originally designed to handle 25,000,000 cu. ft. of natural gas per day. Prior to the plant's initial operation, it was determined that an additional 10,000,000 cu. ft. of absorber capacity would be necessary adequately to serve the area. In studying the economics for the additional capacity, it was found that an addition of 40,000,000 cu. ft. would compare favorably in cost to the proposed 10,000,000 cu. ft. increase. Hence the absorber capacity of the original plant design was more than doubled by installing duplicate absorption and dehydrating sections.

Both sections are complete units within themselves, consisting of inlet and residue scrubbers, absorber, pumps, and dehydration unit. They are commonly connected to the inlet-gas system and both feed their outputs directly into the plant-process system. The dehydration units process the residue gas for the T.G.T. pipe line.

The absorption-dehydration section of the plant operates at a working pressure of 800 psi. with a suitable back-pressure valve to prevent fluc-



The natural-gasoline plant of Del Rey Petroleum Co. and Sterling Oil & Gas Co., serves several fields in Colorado County, Texas.

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going strong since *1899!

THE incredible growth and spread of the oil and gas industry reminds us of nuclear fission. Once started, one thing led to another, ever multiplying in scope. The world's greatest nation, indeed the *whole world,* has benefited enormously by this chain reaction.

Cooper-Bessemer was one of the country's first engine builders to search out ways of solving power problems peculiar to the infant oil and gas industry. In so doing Cooper-Bessemer started its own chain reaction and it's been going on ever since—development after development, paralleling, even anticipating, the industry's growth and changing needs.

To appreciate this you have only to compare our "pride of '99" (the one-lung oil field engine shown opposite) with our latest engines and V-angle compressors—units that, like their many predecessors, are now setting *new* records of performance . . . helping solve the industry's problems *today.*

At this time especially, a *grateful* Cooper-Bessemer salutes the oil and gas industry and extends congratulations to the industry on its brilliant progress during 50 years of oil in the Southwest.

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**Although Cooper-Bessemer and its products date back to 1833 and were allied with the very earliest oil and gas "activities", the one-lunger shown opposite was one of our first internal combustion oil field engines—a semi diesel. Other milestones included "new-type" Cooper-Bessemer gas engines for Oklahoma's first two natural gasoline plants.*

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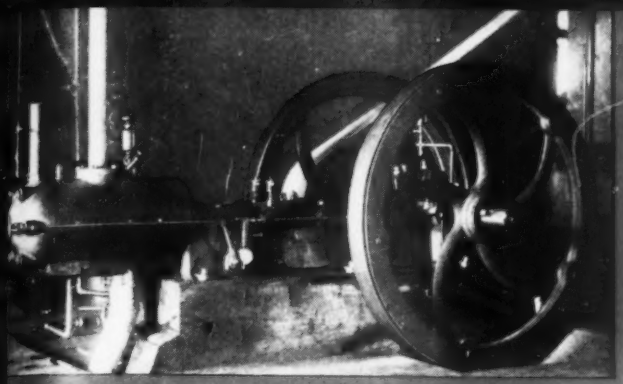
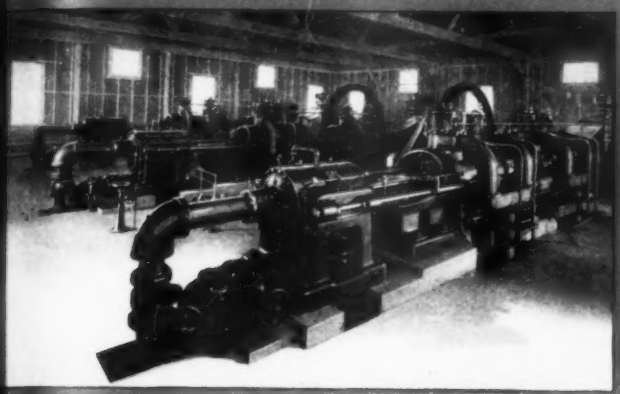
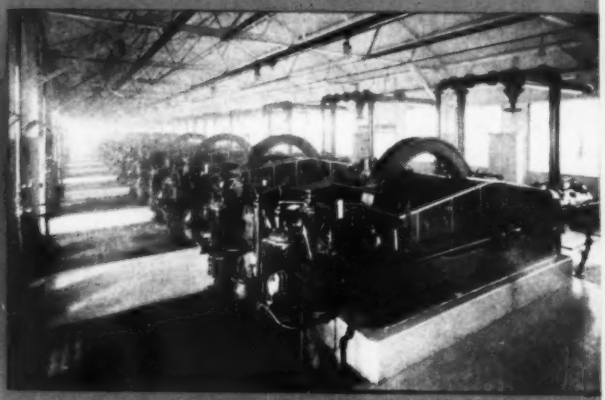


Forerunner of many full diesel types, this Cooper-Bessemer one-lung semi diesel went into oil field service in 1899.

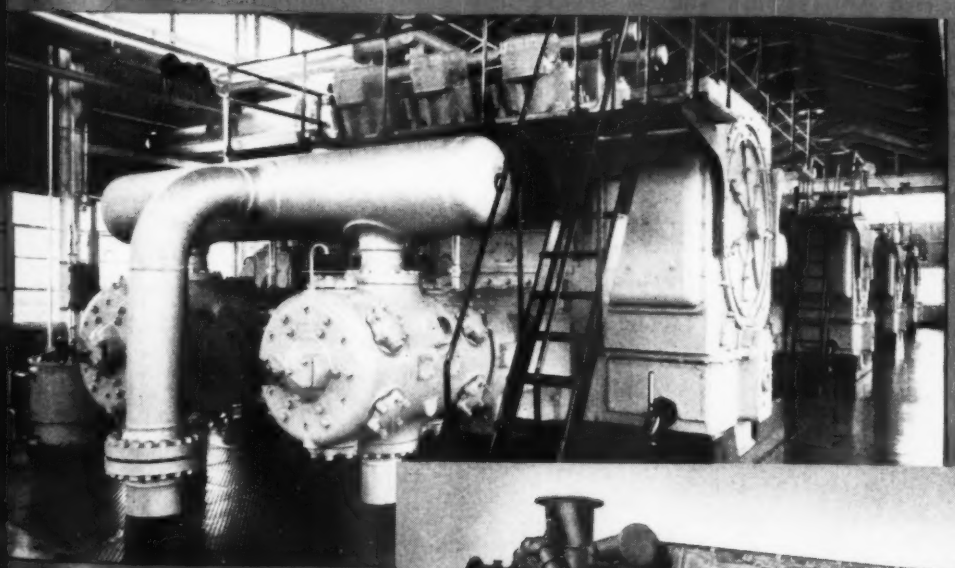
Belt-driven set-up in early Texas refinery, powered by Cooper-Bessemer gas engine—tops in its day.



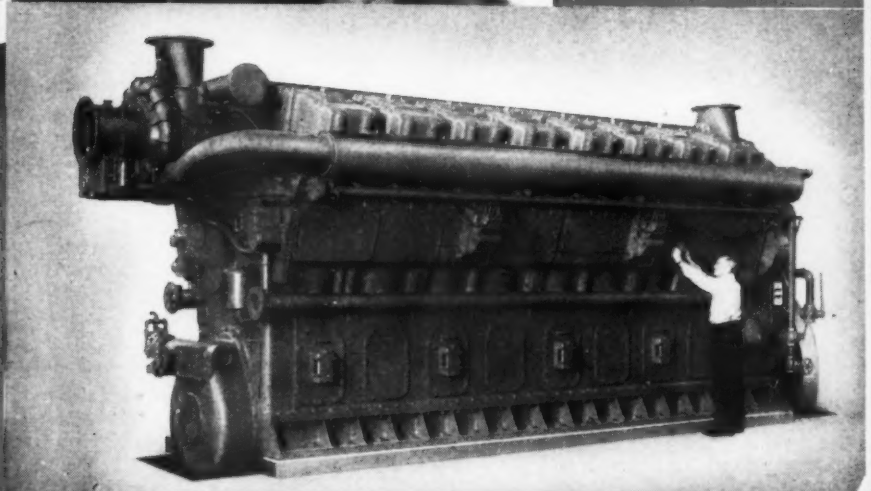
Cooper-Bessemer 245 hp tandem compressor engines installed for gas transmission in 1911.



Eighteen 160 hp Cooper-Bessemer twins in one of the Seminole's largest gasoline plants . . . back in '24.



GMW's—latest Cooper-Bessemer V-angle compressor design. The V-angle family—modern, compact GMW's, GMV's and GMX's, meet all compressor requirements from 220 to 3000 bhp.



Recently developed V-design of Cooper-Bessemer well-proved Type LS engine. Cooper-Bessemer 4-cycle gas, gas-diesel and diesel engines are built in a full range of sizes and types from 100 to 3750 hp.

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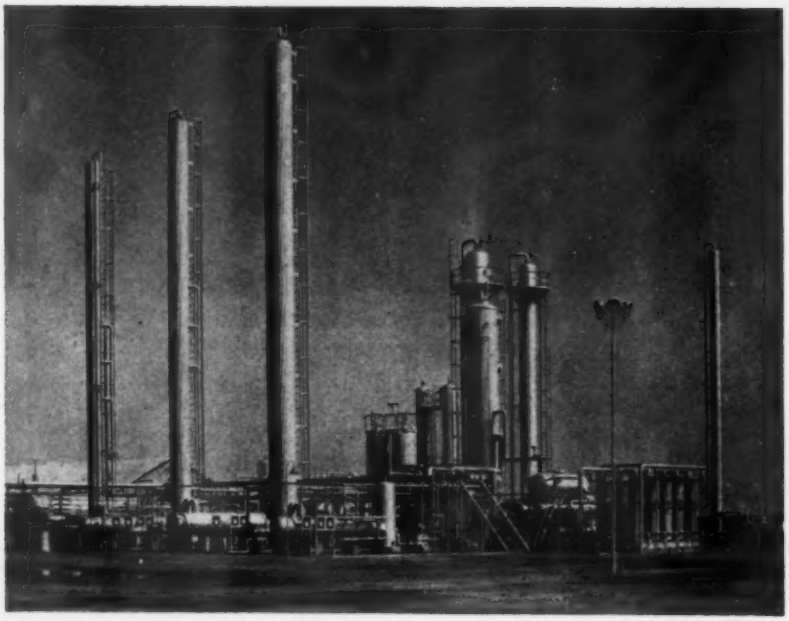

Input natural-gas capacity rating of the Del Rey plant located in Colorado County, Texas, is 65,000,000 cu. ft. daily.

tuations in the T.G.T. system from disturbing plant operations. Three per cent of the residue gas is available for plant use with the remainder going to T.G.T. A complete metering system is used to insure that the contractural obligations are met.

All prime movers in the plant are high-speed internal-combustion motors operating at 900 r.p.m. Two V-8 high-compression, valve-in-head motors are used on the water pumps. These engines, manufactured by Le Roi Co., develop 100 hp. at 1,240 r.p.m. each and have been in operation continuously since the plant was placed on stream early in 1950.

The plant's three recompressors are driven with Le Roi engines. These units, rated approximately 175 hp. at 900 r.p.m., are six-cylinder type. Similar Le Roi units drive the plant's electrical-generating equipment. Power for the two lean-oil pumps is supplied with four-cylinder units rated approximately 115 hp. at 900 r.p.m.

Two boilers having a working pressure of 350 psi. and rated at 150 hp. provide steam power throughout the plant. The steam-condensing system is completely enclosed.

Water Supply

Water supply for the plant is tapped from two different strata at depths of approximately 400 ft. One well pump is operated by Le Roi four-cylinder engine while the other is driven by an electric motor. The combination of two strata and two sources of power insures against loss of water supply.

The water is treated as produced and then is sent to a 1,250-bbl.-capacity storage tank providing a "floating" supply on the system. The water is treated again on its way to the boilers and cooling towers to offset the effects of internal corrosion. The second treatment is handled by contract with Betz Water Conditioning Co.

An interesting note is the open building used to house the gas engines. While the operators feel that this is an excellent feature in certain areas, the dust from adjacent rice farms makes this somewhat undesirable at the Chesterville location.

A loading rack for five tank cars is located 2,500 ft. from the plant. Additional trackage is installed to allow cars to be switched to the loading rack from either direction. Previously the tank cars had to be cut out of trains at Chesterville, causing a 24-hour delay in car movement. It is felt by the operators that the costs of the new track will be easily met by the savings effected.

Throughput

The present throughput is 40,000,000 cu. ft. per day of wet gas from which the plant extracts 99 per cent of the pentanes, 95 per cent of the butanes, and 30 per cent of the propane.

In addition to the residue gas, daily products of the plant are 10,000 gal. of 12-lb. R.v.p. gasoline, 16,000 gal. of butanes, and 10,000 to 12,000 gal. of propane. Storage facilities are available for 80,000 gal. of gasoline, 60,000 gal. of propane, and 100,000 gal. of butanes.

The developed and undeveloped acreage dedicated to the plant amounts to approximately 21,000 acres located in the following areas: Orange Hill field, Chesterville unitized block, West Chesterville area, Lissie area, and South Lissie area.

Contractors

Prime contractor for the plant was O. L. Olsen, Houston, which supplied the engineering, design, and construction. Subcontractors include: Wyatt Metal & Boiler Works, Inc., Houston (absorbers); Southern Engine & Pump Co., Houston (engines and pumps); J. B. Baird Co., Shreveport (heat exchangers and storage tanks); Engineers & Fabricators, Inc., Houston (heat exchangers); Black, Sivalls & Bryson, Inc., Kansas City (regulators and control valves); General Weldding Works, Houston (storage tanks); and Tulsa Boiler & Machinery Co. (fractionators and still). All instruments were manufactured by Foxboro Co.

All prime movers in the Del Rey plant are high-speed internal-combustion motors operating at 900 r.p.m. Here is shown some of the engine-powered equipment, the water pumps and recompressors.

MUD BOWL WINNER '51

Frank Conners, Arkansas contractor, backs his International against the field

FILL 'ER UP—that's the order of the day at this old slush pit. A typical oil-field job where International's power and speed and maneuverability really pay off!

Frank Conners of Magnolia, Arkansas, knows an oil-field "winner" when he sees one. That's why he's picked five International crawlers in a row . . . and come out in the money every time!

Conners' newest TD-14A is shown here, filling in an old slush pit near Bucker, Arkansas. Its operator, Ira Williamson, says, "This tractor beats 'em all for oil-field work. But then, all five of our Internationals are good. They go longer without repairs, have just the right weight, wonderful power and speed, and they're a cinch to load and transport."

There are Internationals with matched equipment for every oil-field need. Their speed, power and dependability mean more work done in less time—more money-making for you. See your International Industrial Distributor. His service facilities and factory-trained staff work for you in his shops or at your sites. And no other man offers you so much in the way of power that pays!

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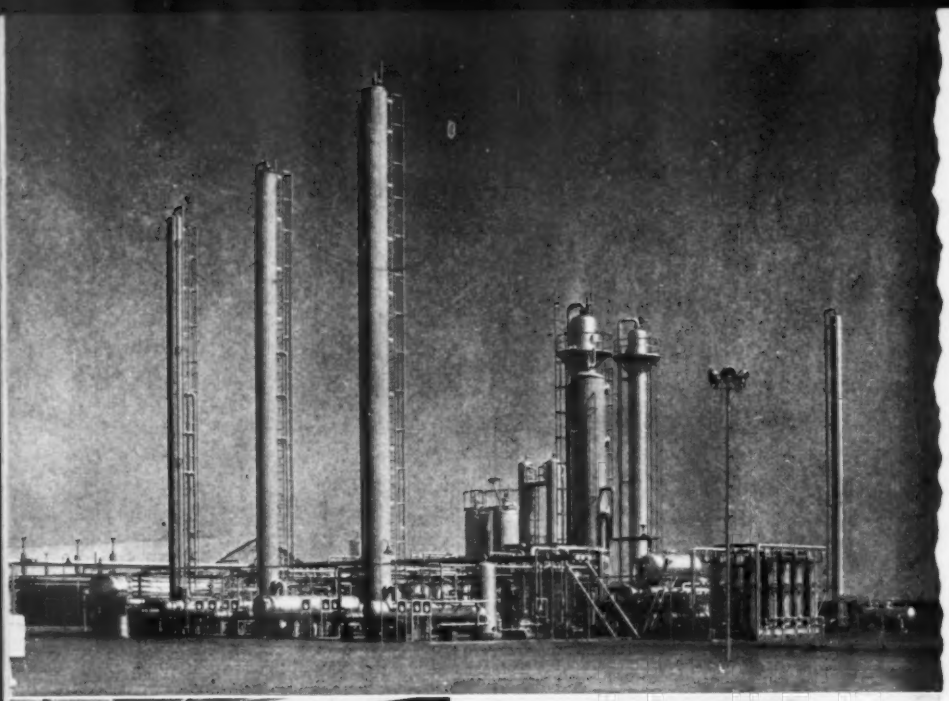
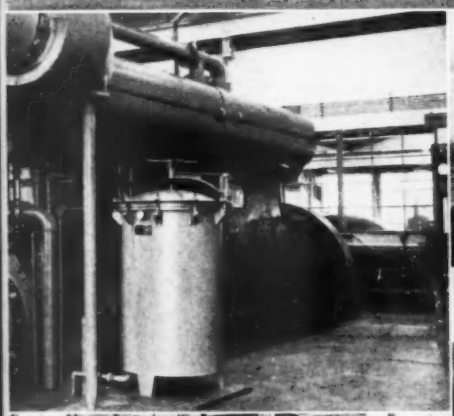
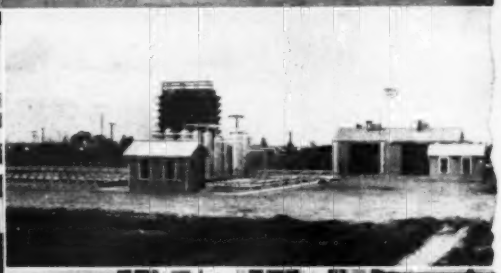
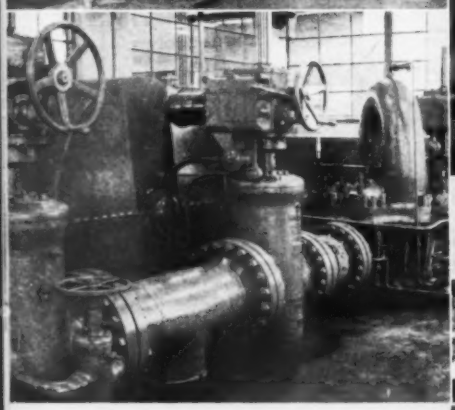
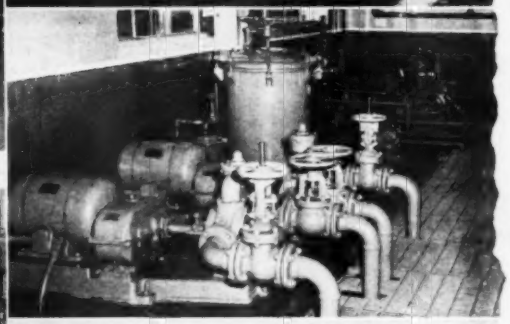










1945
Mid-Co.
Malakoff, Texas

1946
Southern Minerals
Agua Dulce, Texas
Hunter & Hunter
Novice, Texas
T G T
Jefferson, Texas

1947
Warren
Fairbanks, Texas
T G T & Gulf States
San Salvador, Texas
Pan American
Kountze, Texas
Gray Wolfe
Pinehurst, Texas

1948
Warren
Fairbanks, Texas
Lion
Shuler, Arkansas
Wehlu
Edmond, Oklahoma
Warren
Mobile, Alabama
Gulf
Kiefer, Oklahoma
Barnsdall
McFaddin, Texas

1949
Texas Co.
Archer City, Texas
Lion
Shuler, Arkansas
Barnsdall & Sterling
Bloomington, Texas
Baldridge & King
San Pablo, Texas
Barnsdall
Placedo, Texas
Reno Oil Co.
Geraldine, Texas

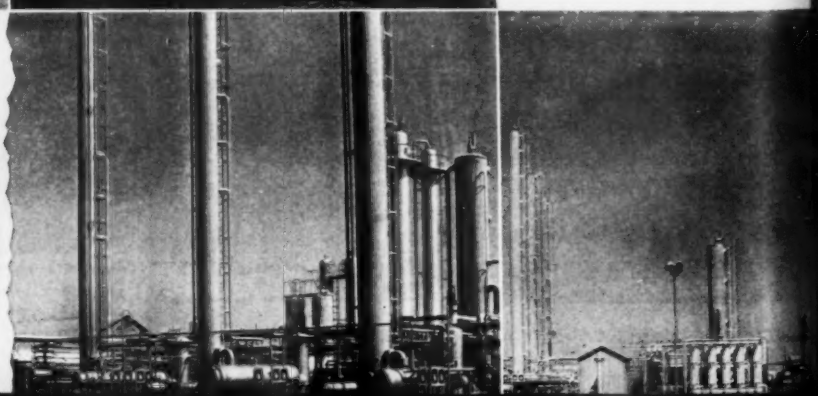
1950
Del Rey
Chesterville, Texas
Humble
South Mayes, Texas
General Crude
Dayton, Texas
Mid-Valley
Clarkson, Ky.
Pecos
Orla, Texas

1951
Pan American Production
Willamar, Texas
T G T
East Bernard, Texas
Del Rey
Chesterville, Texas
General Crude
Dayton, Texas
Texas Co.
Scurry County, Texas

Natural Gas
Processing Plants

O. L. OLSEN CO.

Engineers & Constructors
535 Esperson Building
Houston 2, Texas



XUM

Texas Natural Gasoline Corp. Obtains Over

90 Per Cent Propane Recovery From 50,000-Bbl. Salt Reservoir

by John C. Reidel
Mid-Continent District Editor

PROBLEM: STORAGE OF L.P.G.

Economical and safe storage is a No. 1 problem of the liquefied petroleum-gas industry.

L.P.G. manufacturing facilities have been greatly expanded to meet increased over-all demand in recent years. The need for additional storage, to allow for seasonal variation in demand, has therefore been sharply intensified.

Unusual methods employed in a limited number of projects to date are: (1) storage in depleted oil and gas formations, and (2) storage in water-bearing formations. However, low recovery has been experienced with these methods. The new method of underground L.P.G. storage described here features high recoveries of 93 to 99 per cent, with cost figured at less than $2 per barrel. The method was developed and is licensed by Hydrocarbon Storage, Inc., of Fort Worth. Technical information for this article was furnished by G. H. (Smoky) Billue, assistant manager of Hydrocarbon Storage.

UNDERGROUND storage of liquefied petroleum gases in reservoirs dissolved by circulating fresh water in upper Permian salt beds in West Texas has been successfully employed in the two projects tested to date. The system described here is located in Benedum field, Upton County, Texas, and is operated by Texas Natural Gasoline Corp. which also operates a natural-gasoline plant at that location with facilities for manufacture of L.P.G. In the initial commercial service of the system, during which close to 50,000 bbl. of propane was stored, the recovery was over 93 per cent.

The other storage well of this kind, located in Winkler County (Keystone field) is now at approximately 35,000-bbl. capacity and has been tested with both propane and butanes manufactured at the nearby Sid Richardson gasoline plant. *(An account of this project appeared in The Oil and Gas Journal August 17, 1950, page 59.)*

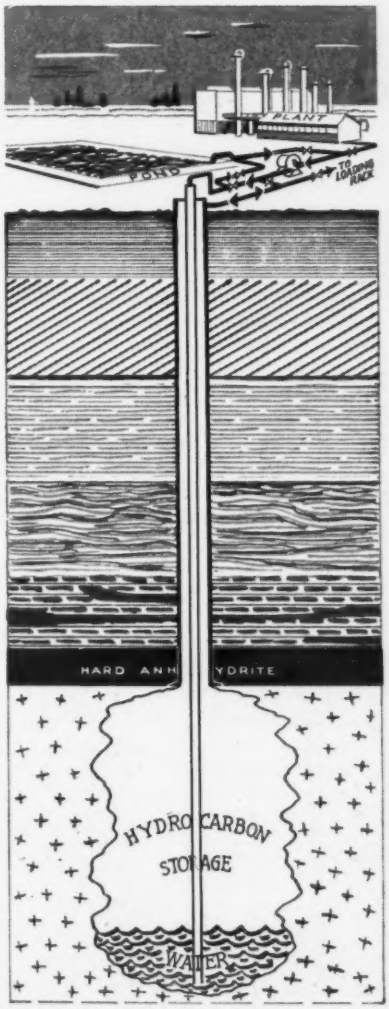
Salt Reservoir

The upper Permian salt section of West Texas is generally a little over 1,000 ft. thick. In the storage well in Benedum field, the top of the salt is at 1,290 ft. The salt is overlain with a stratum of solid anhydrite in which 7-in. casing was set at 1,284 ft. The hole was drilled to a total depth of 2,000 ft., as shown in the caliper survey, bottomed in salt, and 2.5-in. upset tubing was run.

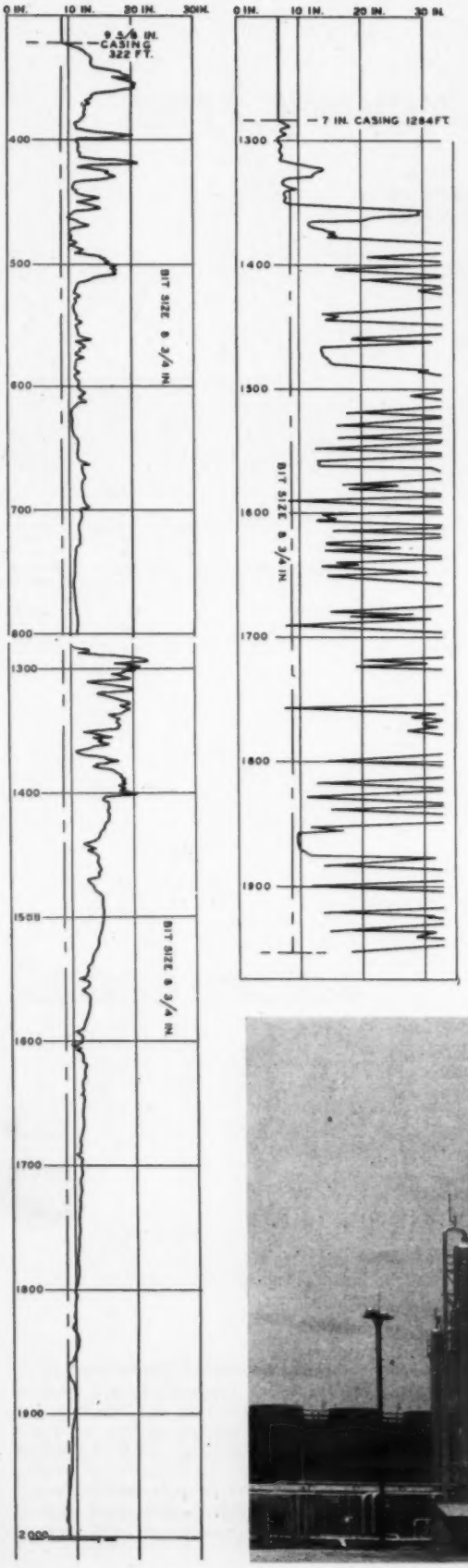
A conventional shallow-well christmas tree was hooked up with a positive-displacement pump so that fresh water could be injected either into the tubing or into the annulus. After circulating for 48 hours (see caliper survey) a reservoir with an average diameter of 32-34 in., and 600 ft. deep had been washed out. Circulation was continued thereafter at about 4 bbl. per minute of fresh water until a hole had been washed out with the desired storage capacity.

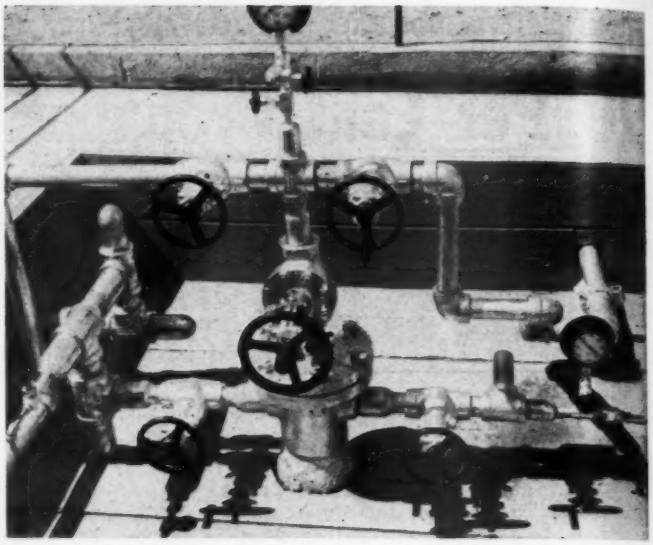
The first returns were only 10 per cent saturated with salt, but as the hole was enlarged, thereby increasing the area of salt formation exposed to water, and the circulation was continued, salt saturation of the effluent water continuously increased and leveled off at approximately 97 per cent saturation after about 6,000 bbl. circulation.

The salt beds consist mainly of sodium chloride with some chlorides of potassium and magnesium interspersed with anhydrite stringers and other insoluble matter. It was estimated that at 100 per cent saturation, 6.1 bbl. of water will dissolve 1 bbl. of formation and the computed volumes of space formed using this estimate checked very closely with the dissolved volume indicated by a caliper survey. The solubility of salt in water varies only to a small degree with temperature. It is believed that the volume of salt dissolved out of a formation may be determined with sufficient accuracy for all practical purposes from the quantity of fresh



Schematic diagram of underground L.P.G. storage in salt reservoir. Storage space is created by washing out salt formation with water. In the system operated by Texas Natural Gasoline Corp., L.P.G. is injected into the annulus displacing water through the tubing. L.P.G. is recovered by injecting water through tubing. Alternative methods for injection or recovery of L.P.G. may be used.





Above: A conventional shallow-well christmas tree is hooked up with a positive-displacement pump for injection of water.

Left: Caliper surveys taken on drilling of well and during early circulation of fresh water. (Left) Hole was drilled to total depth of 2,000 ft. and 7-in. casing set at 1,284 ft. (Right) After circulating fresh water for 48 hours a reservoir with average diameter of 32 to 34-in. and some 600 ft. deep had been washed out.

Below: This plant, operated in Benedum field by Texas Natural Gasoline Corp., is capable of extracting 200,000 gal. per day of hydrocarbon liquids, including L.P.G.

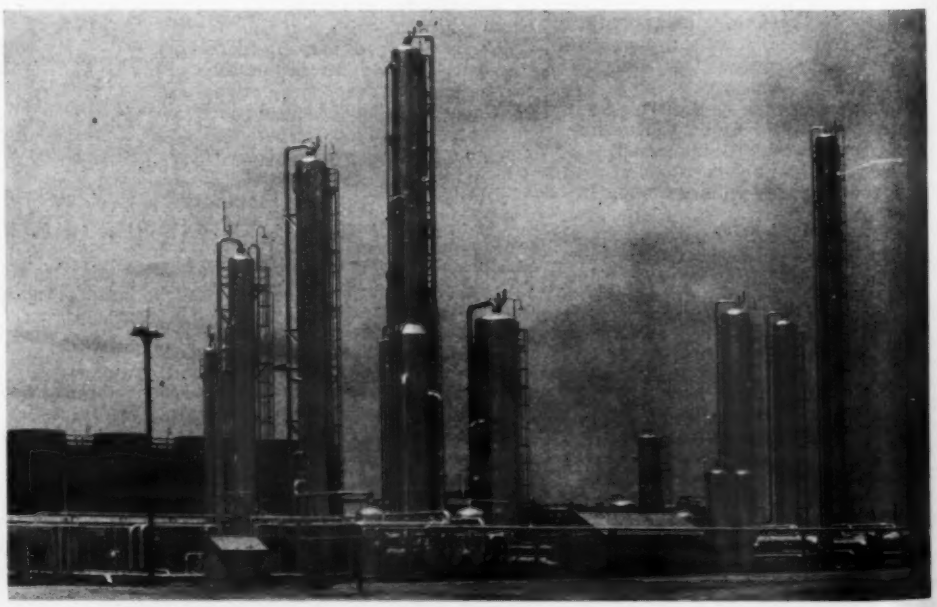
water injected and the salinity of the effluent water.

No detectable loss of fluids was caused when, on several occasions, surface pressures in excess of 500 psi. were applied to the annulus while circulating. This surface pressure plus the hydrostatic head of the circulating fluid caused a pressure against the salt formation equivalent to a gradient of 0.86 psi. per foot. Consequently, as no such pressures are required in normal operation, the possibility of loss of stored products to the formation is considered to be remote.

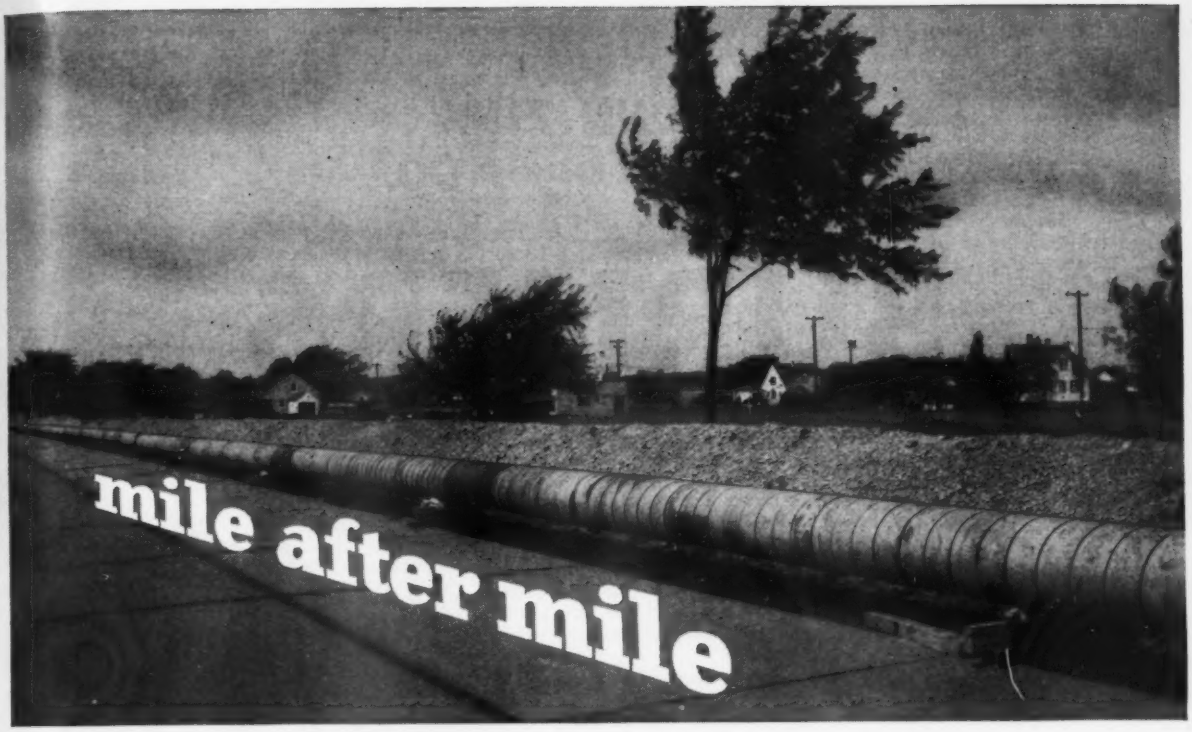
L.P.G. Injection

As the upper Permian salt section has shown no tendency to break down at excessive pressures, it has been found most convenient to store the L.P.G. above water in the storage

(Continued on page 236)



XUM



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Chicago 54, Illinois

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IRON – RUST

XUM

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They permit perfectly even distribution of heat in the furnace.

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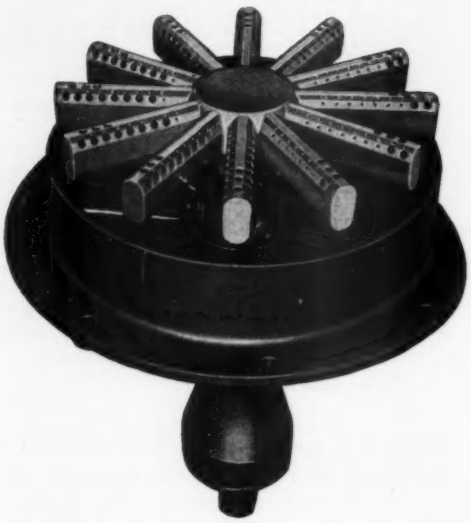
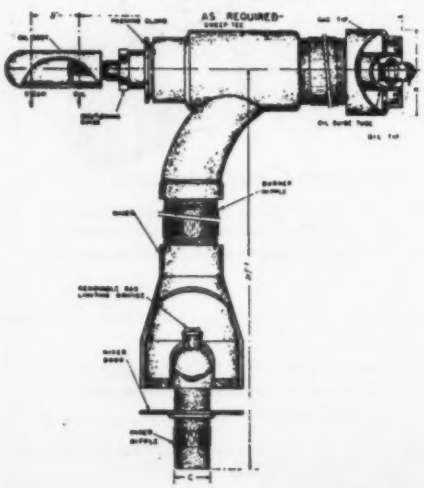
Any commercial fuel oil may be burned when properly prepared.

Extreme simplicity of design and ease of control prevent operational difficulty.

High sulphur content gases may be burned without port stoppage.

They give maximum duty with a minimum of furnace draft.





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Operates on all pressures—Few ounces to 50 lbs.

Sharp stiff cylindrical flames at low excess air.

100% primary air with 8-1 turn-down range.

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WRITE FOR LITERATURE

JOHN ZINK COMPANY

4401 South Peoria **Tulsa, Oklahoma**

Reservoir Data Sheet for Gasoline-Plant Calculations

by Joseph A. Kornfeld
Mid-Continent District Editor

DETERMINATION of the adequacy of reserves to support investment in a gasoline plant may be materially assisted by the use of a reservoir data sheet. One useful form is shown below, for assembling and summarizing gas-reserve data.

The chart shown, in use is printed on 11 by 7-in. vellum, to permit low-cost reproductions to be made. The size enables the sheet to be folded, punched, and placed in a standard three-ring binder. When typing on the vellum sheet it should be backed up with carbon paper. Where the form is used for a permanent reserve record, it can be printed on heavy ledger stock.

Basic reservoir data.—One chart is used for each reservoir. The value of "net reservoir volume" is based on the net pay thickness shown in Line 6. Reserve factors are first set out on the basis of "in place" calculations obtained from core and electric-log data.

Recoverable reserves. — Logically, Line 33 commences with the heading "original reserves"—this is identified as the original volume of recoverable gas and distillate reserves calculated by the volumetric method from the use of recovery factors shown in Lines 30 and 31. The term "gross," Lines 35-41, refers to the full eight-eighths interest and "net," Lines 36-42, refers to the campany's share of the gross reserve underlying the entire reservoir. (The interest factor is identified as the decimal portion of eight-eighths, which is not to be confused with the term "cost factor" (not used here), which refers to the decimal fraction of the working interest.

From the original recoverable reserves, the cumulative production, are substracted to obtain "remaining recoverable reserve."

Specimen log.—Preferably, this should be a detail log on a reduction of a 5 in. to 100-ft. scale. The top and bottom of the sand, as well as each gas-oil and oil-water contact, should be marked in both actual and subsea depths. In the case of an electric log, it is important that each resistivity and spontaneous potential curve be identified directly. Scale headings should be traced for each curve and placed at the top of the respective column. The electrode spacings and the resistivity of the mud may be placed at the bottom of the column. Where all log detail must be preserved, direct prints of the entire reservoir sheet may be made and a photo-copy white print of the electric log detail pasted over each direct print.

Applications.—Utility of the chart lies in the following:

1. Summarization of pertinent data for the determination of reserves for a gasoline plant.

2. Determination of basic data for each reservoir where several companies must agree on reservoir volumes and reserve factors leading to equity determinations, for various studies.

3. Consolidation of data for a field, or a group of fields, for a major gas reserve developmental program.

4. Use as a permanent gas-reserve ledger sheet.

BASIC RESERVOIR DATA

All Volumes Measured at 14.7 psia. and 60°F

Date as of_____, 19___

1. NAME OF RESERVOIR
2. Producing Depth: Average (Ft.)

GEOLOGIC AGE

ACREAGE

3. Proven Developed: (Ac.)
4. Proven Undeveloped: (Ac.)
5. Total Proven: (Ac.)
6. Pay thickness: Average (Ft.)

NET RESERVOIR VOLUME

7. Acre-Feet: Proven Developed:
8. Acre-Feet: Proven Undeveloped:
9. Acre-Feet: Proven Total:

MEDIA DATA

10. Porosity: Average (pct.)
11. Permeability: Average (md.)
12. Connate Water: Average (pct.)
13. Reservoir Pressure, Original (psig.) @ datum of Ft. Subsea
14. Reservoir Pressure: Current (psig.) @ datum of Ft. Subsea
15. Bottom-Hole Temperature: deg. F. @ datum of Ft. Subsea
16. Deviation Factor "Z", Original

DEVELOPMENT

17. Wells: No. developed
18. Wells: No. to be recompleted
19. Wells: No. to be drilled
20. Wells: Ultimate number

WELL TEST DATA

21. Wells: No. tested
22. Pressure: Average shut-in bottom-hole
23. Gas-Oil Ratio: Average (MCF./BBL.)
24. Separator Recovery: (BBLS./MMCF.) @ psig. and deg. F.
25. Specific Gravity: Field Calc
26. Total Open Flow Capacity: (MMCF./D)

RESERVE FACTORS

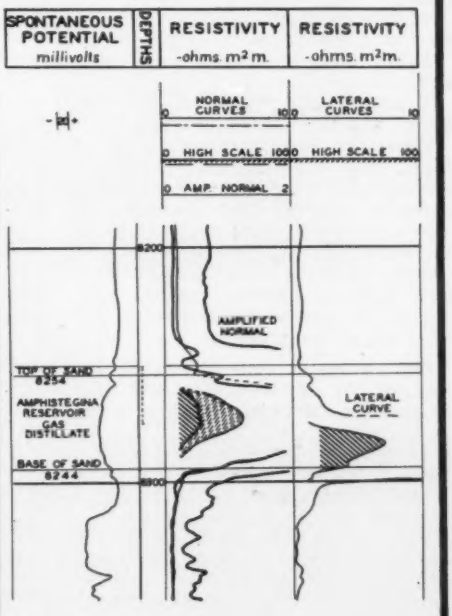
27. Gas in Place: (MMCF./Ac.-Ft.)
28. Distillate in Place: (BBLS./Ac.-Ft.)
29. * Recovery Factor:
30. Recoverable Gas: (MMCF./Ac.-Ft.)
31. Recoverable Distillate: (BBLS./Ac.-Ft.)

REMARKS

32.

RESERVES	DISTILLATE (Bbls.)	GAS (MMCF)
ORIGINAL RESERVES		
33. Proven Developed		
34. Proven Undeveloped		
35. Total: Gross		
36. Total: Net (Int. Factor_____)		
PRODUCTION		
37. Cumulative: Gross. (At_____, 19____)		
38. Cumulative: Net: (Int. Factor_____) (at_____, 19____)		
REMAINING RESERVES		
39. Proven Developed: (at_____, 19____)		
40. Proven Undeveloped		
41. Total: Gross: (at_____, 19____)		
42. Total: Net: (Int. Factor_____) (at_____, 19____)		

SPECIMEN LOG.



SPACINGS: AM = 16-IN. A = 64-IN. OA = 18 2/3-IN.
MUD RESISTIVITY: Rm = 0.44 ohms AT 93 °F.
BIT SIZE: d-IN. = 9 7/8-IN.

FIELD

RESERVOIR

Chart showing basic reservoir data, reserve information, and specimen log for data sheet for gasoline plant gas-reserve calculations.

Financial Significance of

Fractional Analysis

by H. H. Beeson*

Fractional analysis of gas was unheard of in the days when natural-gasoline plants were designed from a few sketches and without the benefit of any basic design data. In fact, in those days one could order a complete gasoline plant from a compressor manufacturer, just as a purchase is made out of a mail-order catalog—except that there wasn't as wide a selection. Present-day gasoline-plant design, involving plant investment running into the millions of dollars, is a different matter.

Today natural-gasoline engineering begins with analysis or calculation of the inlet gas-stream composition. Sound plant design and efficient operation are increasingly dependent on accurate fractional analysis. The significance of such analysis as translated into plant investment and operating cost is brought out in this paper.

IN order to design properly a modern gasoline plant it is absolutely necessary to know the composition of the inlet gas stream. Back of the analysis is the important step of securing a representative sample. It is often impossible to obtain gas samples under anticipated plant operating conditions. In this case, the inlet analysis may be calculated from flash-vaporization calculations. Samples of the oil and gas are taken at the separator, together with pressure, temperature, and measurement of the gas-oil ratio. From these data and use of equilibrium constants, it is possible to calculate a gas analysis at the anticipated plant operating conditions, and this analysis may be used as the basis for plant design.

Factors in Design

In designing a plant, the following are some of the items to be decided, based upon the anticipated inlet gas analysis:

1. Inlet pressure for gas entering plant.
2. Type of recovery system to employ in plant design.
3. Per cent of recovery of light-end products.
4. Extent of separation of both heavy and light end products.

There are also other factors to be taken into consideration. In establishing inlet plant pressure, pipe-line gathering system and compression cost also must be used in determining the economics. A sacrifice in gasoline content by using a higher inlet pressure must be balanced against savings in the cost of the gathering system and of compressors.

Separators.—In connection with design for the optimum inlet gas conditions, the effect of separator pressures and use of "heater treaters" must be carefully considered. If the plant is designed for vacuum suction, field separators should be elevated to give atmospheric pressure on the oil-gas separation. A careful study of this problem, which can only be properly evaluated by having available fractional analyses, may reveal that the additional income from the sale of gas to the lease due to a higher gasoline content of gas will pay out the cost of elevating separators. Here again, these fractional analyses may be either the actual analyses of streams involved at the desired conditions, or may be analyses calculated at a different condition from that at which samples were taken. In many cases, especially where the oil must be treated, a heater-treater type of separator can profitably be installed. Here again, to properly evaluate the economics, proper analyses of the oil and gas must be made.

Type of plant recovery.—The inlet-gas analysis is of paramount importance in designing the type of plant recovery system—whether oil absorption, vapor rectification, or refrigeration, or a combination of these is used. In determining the per cent recovery of light ends, the analysis again plays an important part in determining the optimum or economical recovery of butane or propane.

The analysis is also the prime determining factor as to whether the plant should produce only L.P.G. from the light ends, produce mixed butanes and propane, or produce normal butane, isobutane, and propane. This same comment also applies to the heavier ends — whether Reid-vapor-pressure natural gasoline is made or whether special pentane and hexane cuts are to be made.

A shift in the percentages of the analysis can alter the design of any one or more of the above items. The difference in size of a gathering system designed for 10 in. of vacuum at the plant against 10 lb. (a difference of approximately 15 lb.) on gathering 50 M.M.c.f. of gas from wells on 40-acre spacing could amount to $60,000 difference in the cost. Carrying into the next step, this same difference in plant inlet pressure would amount to approximately 3,000 hp.—probably costing $750,000.

If absorption is carried on at 750 lb., a deficiency of ½ gal. of the propane content of gas previously reported containing 1.25 g.p.m. of propane, would mean an increase of the oil circulation rate of approximately 40 g.p.m., costing an estimated $20,000 for the same percentage propane recovery. This is just a part of the problem. Management will undoubtedly ask if the oil circulation could be stepped up to recover the same gallons of product. The answer is no in this case since 75 per cent recovery on 1.25 g.p.m. is greater than 100 per cent recovery of the 0.75 g.p.m. actually found upon correct analysis.

In case of a relatively lean gas containing appreciable nitrogen and where a residue gas sale has been made with minimum B.t.u. requirements, an accurate wet-gas analysis is certainly needed so as to calculate how much product can be extracted and still meet the B.t.u. requirements of the residue gas.

Checking Plant Operation

These remarks have pertained to the design of a plant. Now after a plant has been built and it develops that a design production cannot be obtained because of incorrect design analysis, that is when the embarrassing questions begin to be asked. An error of ½ g.p.m. on a 50-M.M.c.f. plant would cause the following annual gross loss in sales:

26-lb. gasoline at 6 cents	$547,500.00
Butanes at 95 per cent recovery at 4 cents	345,750.00
Propane at 75 per cent recovery at 3 cents	205,312.50

It is easy to see what this loss of revenue would do to plant economics—especially if the plant were financed from borrowed money, or if this were a plant the operators were required to build in order to conserve flare gas, or where the economic forecast shows the plant will only break even. If the analysis were ½ g.p.m. in error on each of the above components, the total loss in revenue would be $1,099,562.50. This would be disastrous, to say the least. This may be the extreme, but if the error in analysis were only one-tenth of this magnitude, the loss in resulting revenue would be $109,956.25—which is still a lot of money.

Plant balance.—Most plant operators run periodic plant balances to check plant performances. For illustration, such a procedure can check the efficiency of an absorber and be the means of detecting a poor or faulty operation. Data have been developed to predict quite accurately the performance of an absorber under normal operating conditions. By

(Continued on page 222)

*Magnolia Petroleum Corp., Dallas. Paper presented at N.G.A.A. Low-Temperature Fractional-Analysis Seminar, March 15-16, 1951, at Fort Worth.

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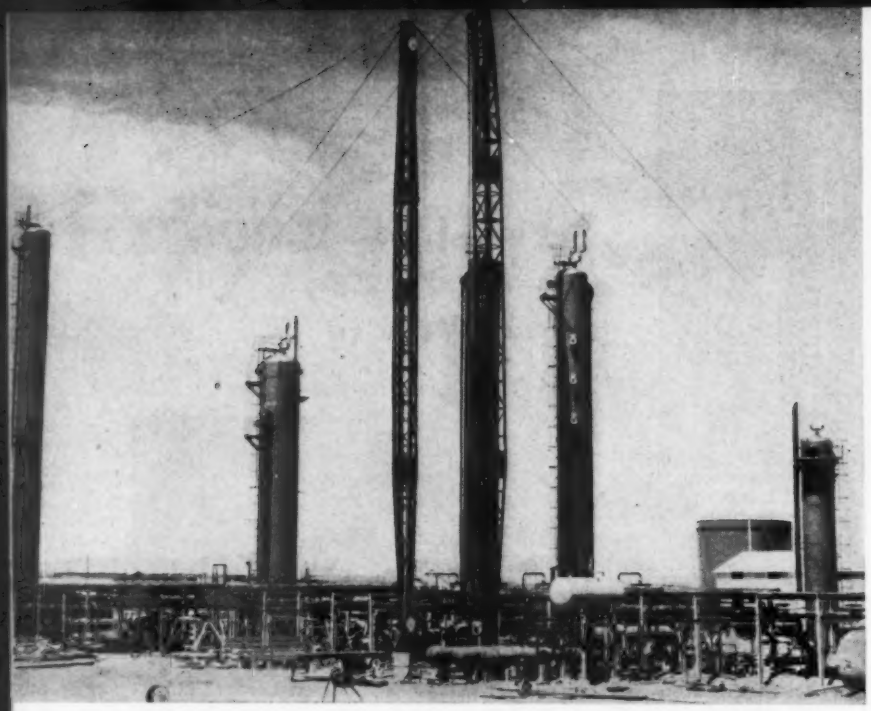
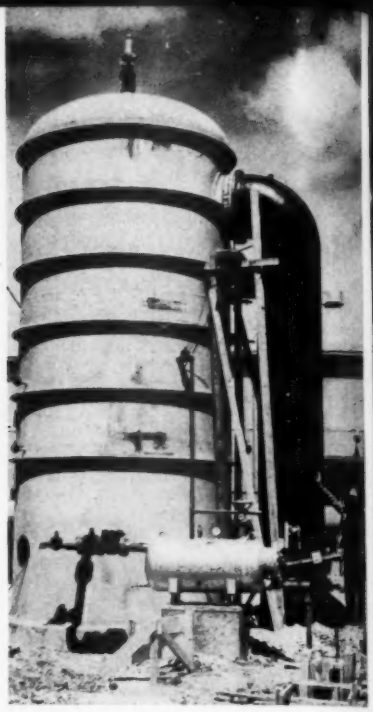


This view of the Snyder gasoline plant operated by Sunray Oil Corp. in Scurry County, Texas, shows the processing area during final construction. Principal vessels, left to right, are absorber, still, depropanizer, debutanizer and gas treater. The two masts are in place for installing the deisobutanizer column.



Incoming natural gas passes from this giant scrubber to field measuring manifold; the line connecting scrubber to manifold is 36 in. in diameter.

Snyder Gasoline Plant Designed to Process 70,000 M.c.f. of Gas Daily

by H. W. Manley

Installation of high-pressure system saves 4 billion cubic feet of gas which would have been flared

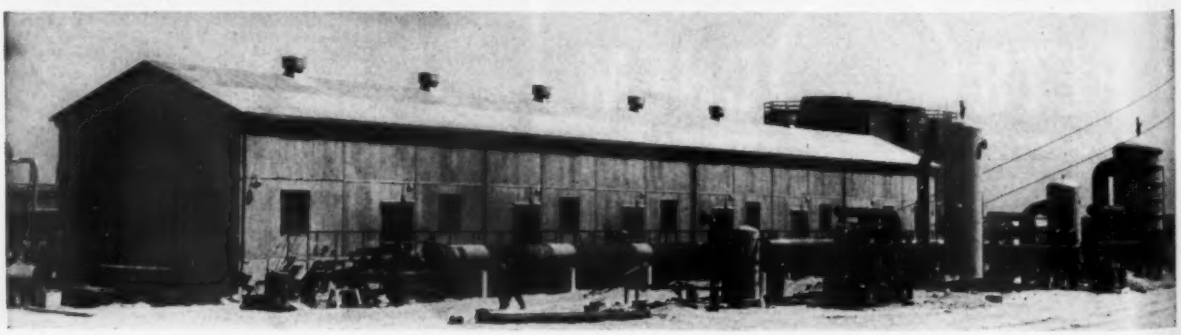
THE new Snyder natural-gasoline plant owned by 30 companies and 60 individuals in the Scurry County, Texas, oil field is located on the von Roeder lease approximately 1½ miles northwest of Snyder. This plant is a cooperative $7,750,000 project for the conservation of gas and manufacture of natural-gasoline products. The gas will be gathered from 850 wells located on 35,000 productive acres in the Kelly-Snyder area. Production is obtained from the Canyon Reef lime at depths of 6,500-7,000 ft.

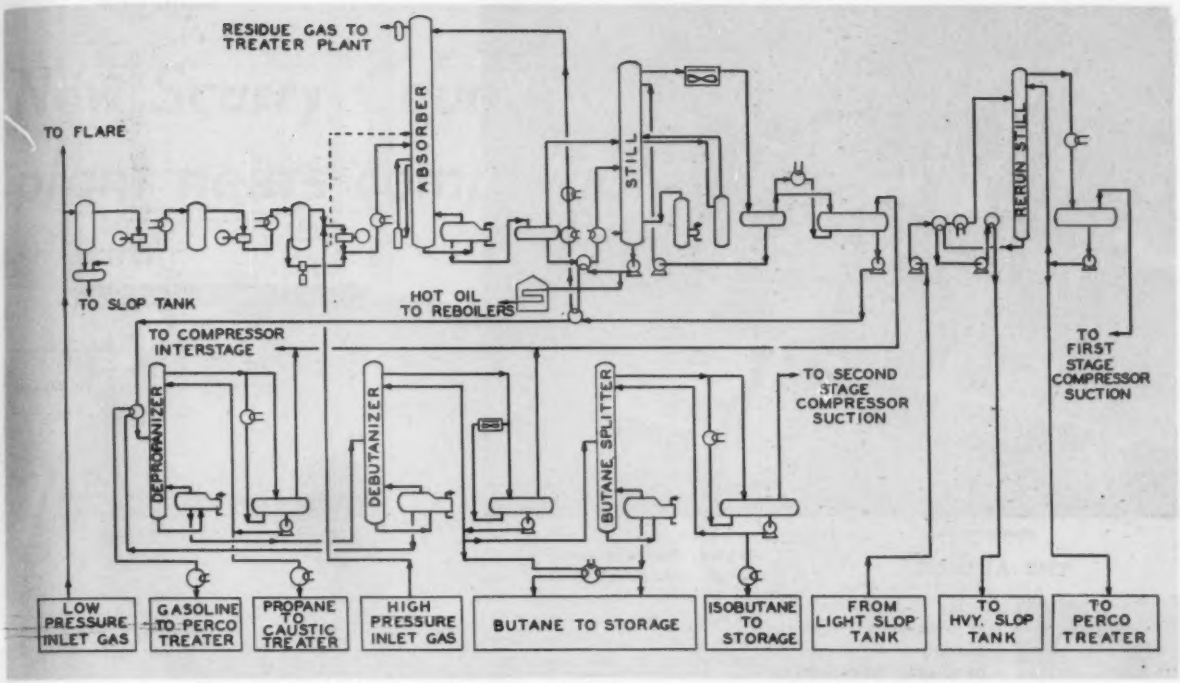
Participants in the Snyder gasoline plant signed a construction and operating agreement effective July 1, 1950. The agreement named Sunray Oil Corp. as operator of the plant and made provisions for a seven-member advisory committee.

The plant is designed to process 70,000 M.c.f. per day of gas which is brought into the plant by two complete gas-gathering systems for low and high pressures. Product output is scheduled as follows: Propane, 230,000 gal. per day; butane, 137,000 gal. per day; isobutane, 38,000 gal. per day; and 18-lb. R.v.p. natural, 142,000 gal. per day.

An interesting conservation feature

Compressor building for Snyder plant. Because of its large size, the compressor header dwarfs the two men shown in left center foreground.





Flow diagram of the processing section of the Sunray-operated Snyder natural-gasoline plant.

of the plan for the gathering system is that the installation of the high-pressure system, done some 12 months prior to completion of the plant itself, will result in the savings of 4 billion cubic feet of gas which would have been flared.

Field Gathering System

The gas-gathering facilities for the Snyder gasoline plant consist of two complete gathering systems, designated in the project as the "high pressure" and "low pressure" systems.

High pressure.—The high-pressure gathering system, completed in July 1950, was installed so that gas could be delivered from the high-pressure separators on the individual lessees' properties to the gas purchasing and pipe-line companies having contracts in the field. The gathering system consists of 90 miles of pipe line varying in size from 8-in., down to 2-in., and requiring 160 or more individual lease gas meters. The gas and pipe-line purchasing companies are Lone Star Gas Co. and El Paso Natural Gas Co. This feature has permitted the lessee operators of the project to start selling and conserving gas from their leases at the rate of approximately 360 cu. ft. of high-pressure gas for every barrel of oil produced. This is approximately 40 per cent of the gas volume being produced in the field and is unusual in that the conventional method in gasoline plants is to only start to sell residue gas at the time the over-all plant facilities have been completed.

From July 1950 until January 1, 1951, 2.317 billion cubic feet had been sold through this high-pressure gathering system, Therefore, all lessee

PARTICIPANTS OF SNYDER GASOLINE PLANT

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3. Sunray Oil Corp., Tulsa
4. Lone Star Producing Co., Dallas
5. Cities Service Oil Co., Bartlesville.
6. Castleman & O'Neill et al., Midland.
7. Skelly Oil Co., Tulsa
8. L. M. Lockhart, Los Angeles
9. Wilshire Oil Co., Los Angeles
10. Seaboard Oil Co. of Delaware, Dallas
11. Pure Oil Co., Tulsa and Chicago
12. Placid Oil Co., Shreveport
13. Ryan, Hayes & Burke, Evansville, Ind.
14. Penntex Oil Corp., Los Angeles
15. Hiawatha Oil & Gas Co., Pittsburgh.
16. J. S. Abercrombie, Houston
17. Claud Hamill, Houston
18. Southern Production Co., Inc., Shreveport and Fort Worth
19. King, Warren & Dye, Midland.
20. Headwaters Oil Co. et al., Dallas.
21. Ryan & Burke, Evansville, Ind.
22. Greenbrier Oil Co., Fort Worth
23. Ralph A. Johnston, Houston
24. William G. Johnston, Oklahoma City
25. Hunt Oil Co., Dallas
26. Youngblood & Foree, Oklahoma City.
27. Saltmount Oil Co., Denver.
28. N. B. Hunt, Dallas
29. W. P. Luse, Dallas
30. Strebor Oil Co. et al., Dallas
31. Stolkin & Koolish, Chicago.
32. Standard Fryer Drilling Co., et al., Dallas.
33. C. H. Lockhart, Jr., and H. R. Bright, Dallas.
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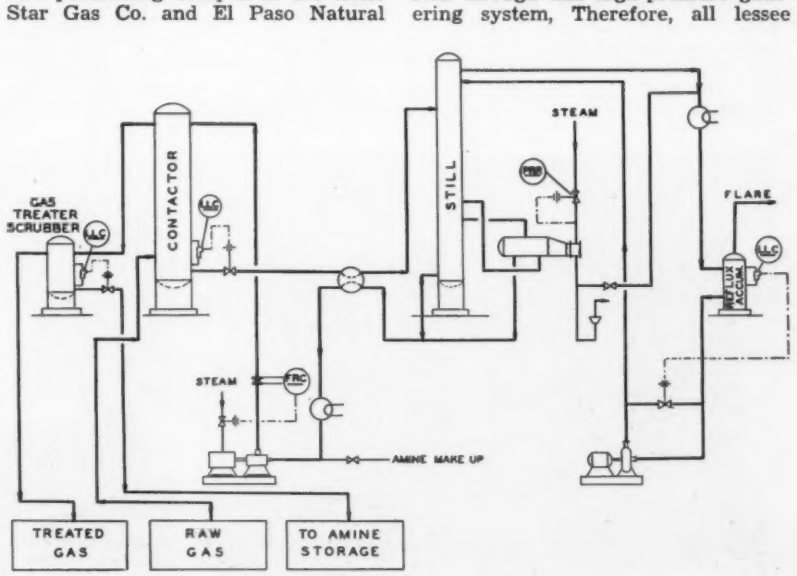
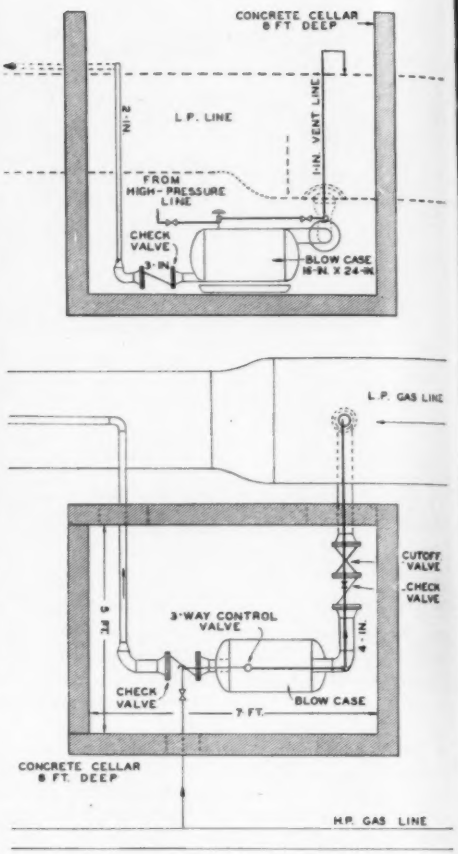


Diagrammatic arrangement of the natural-gas treating section.



Above: Drip-condensate is removed automatically from the low-pressure incoming gas line by this underground blow case. There is a total of 57 of these installations in the huge gas-gathering system. Right: Sectional elevation and plan layouts of piping and equipment arrangement.

THE AUTHOR

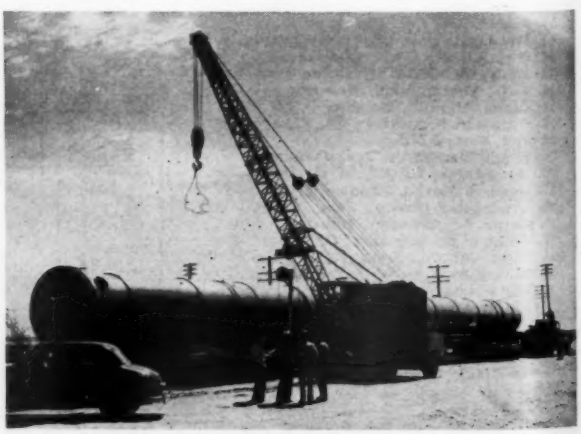
H. W. Manley, vice president and manager of gas-gasoline division for Sunray Oil Corp., has been in the oil industry since 1928 when he worked as a roustabout during the summer for Barnsdall Oil Co. Manley graduated from Oklahoma A. & M. College in 1929 with a degree in mechanical and petroleum engineering and joined Barnsdall's engineering department. In 1935 he was appointed assistant chief production engineer for the Mid-Continent division. He became general superintendent of the gas-gasoline department in 1939 and in 1948 was made vice president and manager of the Mid-Continent production division. Manley was author of an article on the Benton unit-cycling plant which appeared in The Oil and Gas Journal, August 19, 1948.

operators participating in the Snyder gasoline plant were using the high-pressure gas system for conservation of gas by the installation of this system. It should be pointed out that the system will have been in operation about 12 months in advance of the completion of the over-all plant facilities for processing and will have saved approximately 4 billion cubic feet of gas from being flared and wasted.

Low pressure. — The low-pressure system consists of 140 miles of pipe line, starting with a 30-in. pipe at the plant site and going down to 4-in. for gathering lines on the individual leases. Two hundred fifty individual gas meters are served by this system. Because the gas being handled in the low-pressure system will be an extremely rich type, it is anticipated that considerable condensate or drip gasoline will accumulate in the low-pressure field system. Special attention was necessary in design of drips and methods of transporting the drip gasoline into the central plant for processing.

Specially designed blow cases have

Three-cell cooling tower at Snyder.



The plant's deisobutanizer, delivered via trucks.

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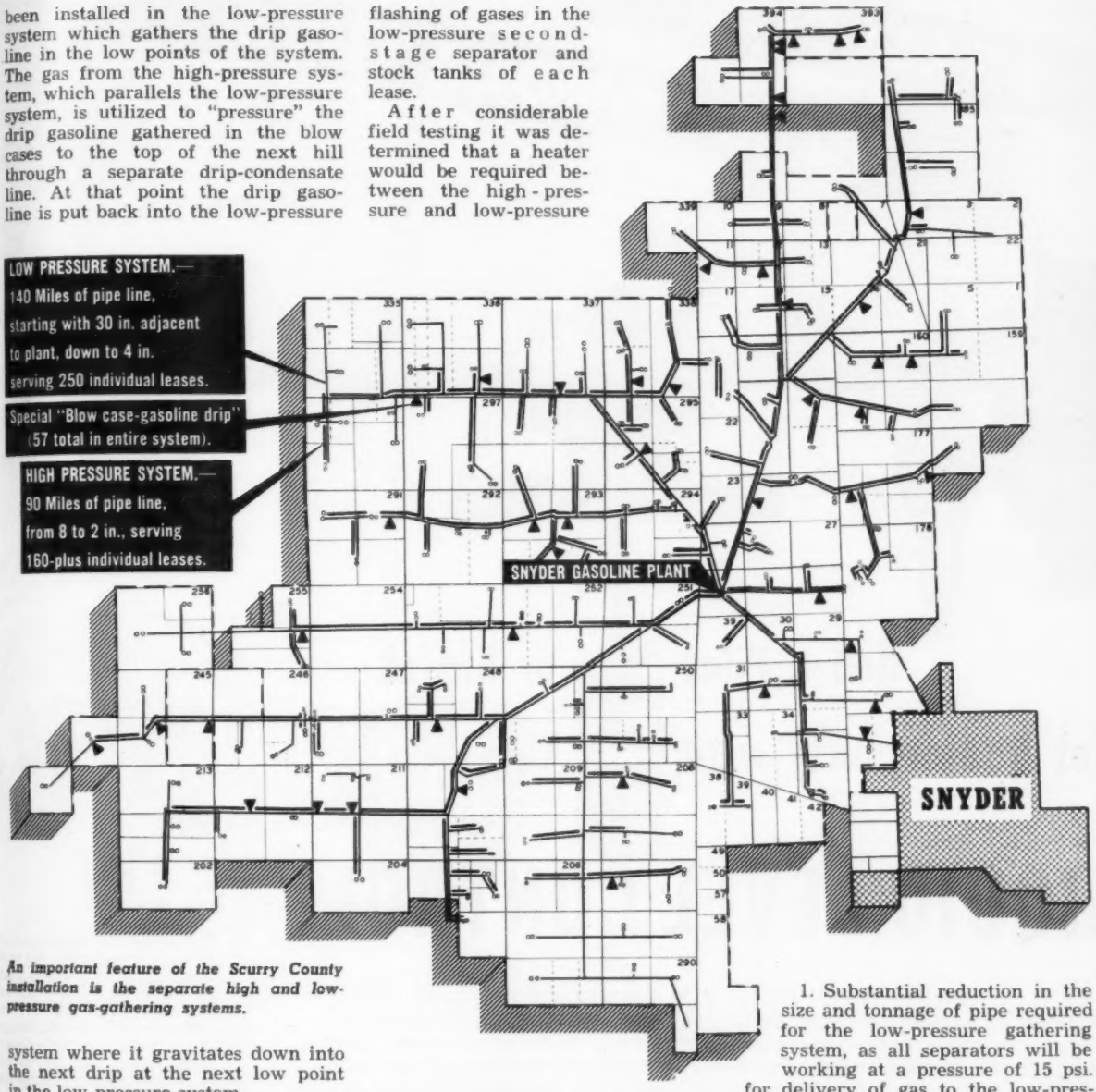
been installed in the low-pressure system which gathers the drip gasoline in the low points of the system. The gas from the high-pressure system, which parallels the low-pressure system, is utilized to "pressure" the drip gasoline gathered in the blow cases to the top of the next hill through a separate drip-condensate line. At that point the drip gasoline is put back into the low-pressure system where it gravitates down into the next drip at the next low point in the low-pressure system.


LOW PRESSURE SYSTEM.—
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to plant, down to 4 in.
serving 250 individual leases.
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(57 total in entire system).
HIGH PRESSURE SYSTEM.—
90 Miles of pipe line,
from 8 to 2 in., serving
160-plus individual leases.
SNYDER GASOLINE PLANT
SNYDER

An important feature of the Scurry County installation is the separate high and low-pressure gas-gathering systems.

The "stage gathering" of the drip gasoline in the low-pressure system, utilizing gravity drainage, has eliminated considerable expense. Pipe-line tonnage was much less than for a complete separate drip-gathering network paralleling the gas-gathering systems. It also has the feature of automatically gathering the drip gasoline rather than the usual drip truck or hand-operated drips for pressuring the drip gasoline into the plant.

Interstage heating.—The installation of the high-pressure gathering system taking gas from 500-psi. working pressure separators on the individual leases required that the Snyder gasoline-plant participants and the individual lessee operators jointly investigate the problem of paraffin formation from the crude oil, as well as how to conserve the maximum casing-head gas production from the flashing of gases in the low-pressure second-stage separator and stock tanks of each lease.

After considerable field testing it was determined that a heater would be required between the high-pressure and low-pressure stage separators on individual leases. These heaters will prevent formation of paraffin deposits in the oil-production lead lines. They also, importantly, will cause the release of an amount of casing-head gas from the second-stage separation (15 psi.) equivalent to that obtained from the conventional design of elevated low-pressure separators operated at atmospheric pressure.

As a result of the heater-separator investigation a hearing was held before the Texas Railroad Commission on March 23, 1950, whereby the commission informally approved use of two-stage gas separation in the North Snyder field gasoline plant, and interstage heating between the gas separators on the individual leases.

Advantages of the interstage heating between separators may be outlined as follows:

1. Substantial reduction in the size and tonnage of pipe required for the low-pressure gathering system, as all separators will be working at a pressure of 15 psi. for delivery of gas to the low-pressure system. In contrast, the conventional low-pressure gas-gathering systems are usually designed on a basis of from 0 to 5 psi. inlet pressure starting from the individual low-pressure separators on each lease.

2. Lease owners or the plant participants would not have to elevate their separators to obtain the maximum amount of flash gas from the oil.

3. Permits a constant casing-head gasoline content to come from the individual leases and prevents climatic changes from affecting the gasoline content of the gas coming from the individual leases.

The interstage heaters are a new departure from the conventional gathering-system designs in the West Texas area, and reduces the loss of gaseous hydrocarbons from the lease stock tanks or as the crude oil is moved by the individual pipe-line

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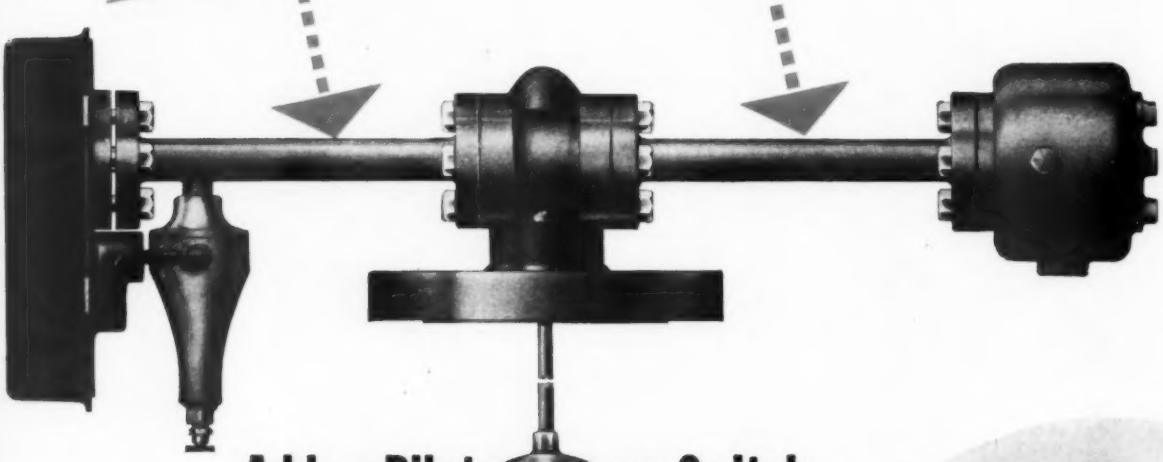

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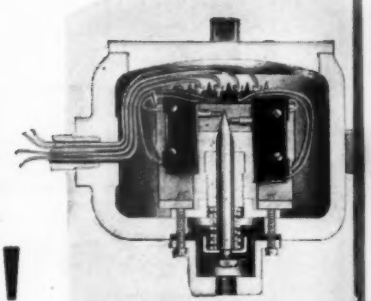

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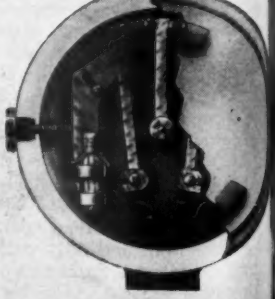

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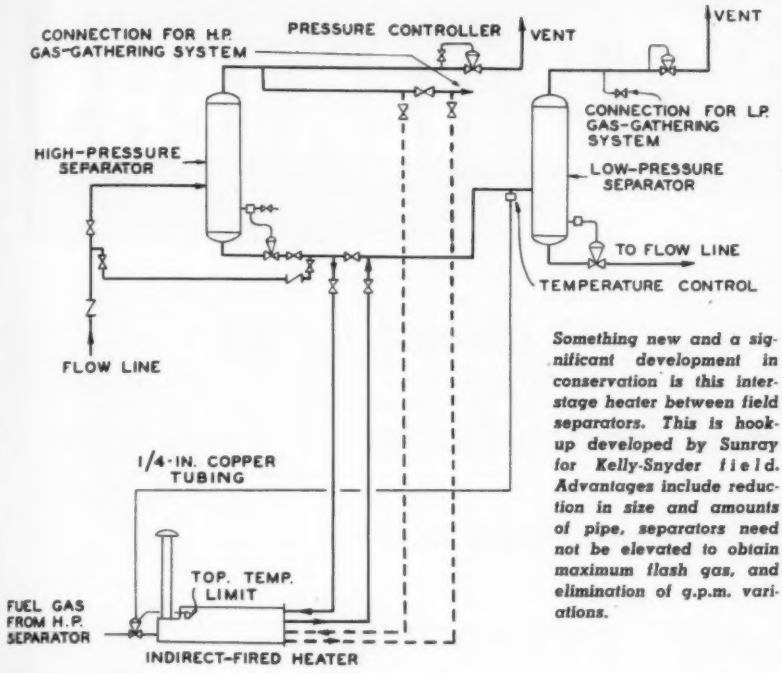

Something new and a significant development in conservation is this interstage heater between field separators. This is hookup developed by Sunray for Kelly-Snyder field. Advantages include reduction in size and amounts of pipe, separators need not be elevated to obtain maximum flash gas, and elimination of g.p.m. variations.

companies from the field to refineries for further processing.

Plant-Design Features

The original Snyder gasoline plant design was based on 50,000,000 cu. ft. per day of gas, recovering 70 per cent of the propane in the gas stream. After engineering work on the plant had been started, it became apparent that an increased gas-handling capacity would be required. As the result of this the seven 1,100-hp. Cooper-Bessemer compressors were supercharged to 1,350 hp. This change would increase the gas-handling capacity of the plant to approximately 70,000,000 cu. ft. per day.

Compressors.—These units are comprised of five compressor cylinders, two operating on first stage, one on second stage, and two on third stage. Approximately 23,000,000 cu. ft. per day will enter the plant at atmospheric pressure and pass through the first two stages of the compressor plant. Approximately 47,000,000 cu. ft. per day of high-pressure gas from the field would then be injected to the suction of the third stage at approximately 135 psig. Third-stage discharge gas at 500 psig. would then enter the processing section of the plant.

The compressor cylinders and clearance equipment have been sized for a wide variety of operating conditions. For example, the compressor plant may be operated to handle approximately 41,000,000 cu. ft. per day of low-pressure gas to the plant through all three stages with no interstage gas injection.

Another unique feature concerning the compressor section of the plant is the inclusion of an integral Fluor pulsation-dampening system in the compressor piping. The actual dampening unit embodies the complete compressor section and discharge piping and includes the headers, laterals, suction and discharge bottles, and cylinder takeoffs. Each compression cylinder is treated separately by dampening equipment. In addition to reducing mechanical vibration to an absolute minimum, the dampening system permits the use of smaller line sizes than would be required in a conventional system.

Deethanizer absorber.—Gas from the compressor plant enters the absorber. Because of the comparative richness of the gas stream involved, stabilization of rich oil at the 500-psig. primary-absorption pressure proved entirely feasible. Therefore, this column is not the conventional gasoline-plant absorber but rather is a deethanizing absorber consisting of an absorption section and a stripping section. A kettle-type reboiler on the bottom of the column provides heat source for the stripping medium. As a result the rich oil leaving this column will be deethanized so that no recycle-vapor streams nor any reabsorption will be required.

The rich oil from the absorber reboiler enters a rich-oil flash tank which will operate at approximately 135 psig. The flashed vapor from this tank enters the fractionation section of the still while the rich oil passes through exchangers and a preheater to the feed tray of the still.

The oil-distillation equipment consists of a conventional gasoline-plant still, employing steam as a stripping agent. As the rich oil will be deethanized, total condensation of the raw-gasoline product from the still overhead may be realized at a pressure of 100 psig.

Fractionation.—The raw gasoline will then be pumped through a train of fractionation columns. The first column is a depropanizer which will produce a specification-propane overhead product. Depropanized bottoms enter the debutanizer which produces specification butanes as a top product and a debutanized gasoline as bottom product or may only partially remove butanes to produce a 26-lb. R.v.p. gasoline bottom product. The butane overhead from this column may either go direct to storage or enter a butane splitter designed to produce a 95 per cent isobutane top product. Normal-butane bottoms from this column will go to butane storage or, in the event the butane splitter is not handling the entire overhead product from the debutanizer, will be combined with the mixed butanes overhead from the debutanizer going into storage.

Treating.—The propane product will be treated with a two-stage caustic wash and then dehydrated with a regenerative-type solid desiccant before entering storage tanks. The natural gasoline from debutanizer bottoms will be treated for removal of mercaptans with Perco solid-type copper-sweetening facilities.

The residue gas from the absorber will enter the contactor of an amine-type gas-treating unit. The gas-treating plant is designed to remove 1.4 per cent CO_2 and 5 grains of H_2S from approximately 36,000,000 cu. ft. per day of gas, the quantity of ab-

A few of the dwellings erected for employes at the Snyder natural-gasoline plant.

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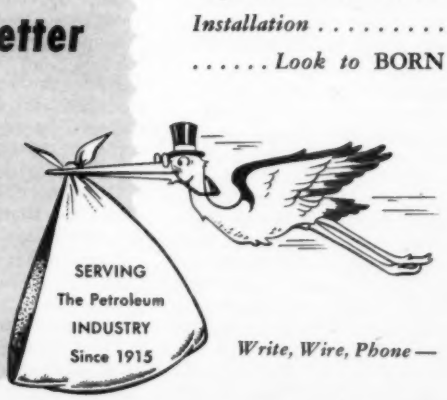

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sorber-residue gas resulting from 50,000,000 cu. ft. per day absorber-feed gas. In addition to utilization of monoethanolamine in the gas-treating solution, diethylene glycol will be employed to reduce any solution-foaming tendencies and minimize gas-treating plant still-reboiler corrosion. The plant also includes a rerun still to strip slop oil.

A cold-lime process will treat all incoming plant makeup water. Effluent from this treater to the cooling tower will be further acid treated. The boiler feed-water makeup will pass through a sodium zeolite unit. Supplemental treatment of the boiler feed water will consist of sulfite and phosphate injections.

Air cooling and heat exchange.—Because of the relative shortage of water in the West Texas area, air cooling will be applied in the plant wherever feasible. Fin-Fan units will cool all compressor lube oil and jacket water. A combined process Fin-Fan unit wherein two services are combined in the same unit by having finned sections for each service in each cell will also be utilized. One of these services is for condensing the still reflux as required while the other serves as the debutanizer condenser. Having the latter service on air cooling obviously necessitated a higher-operating pressure and a higher-design pressure column than normally employed by a debutanizer.

All other heat-exchange equipment in the plant are shell and tube units, including all coolers and condensers.

All plant-process heating with the exception of the gas-treating plant still reboiler is accomplished by a hot-oil system. To minimize equipment this hot-oil system is partially combined with the plant lean-oil system. Rich-oil heating requirements are also obtained from the hot-oil system. This, therefore, entails only one direct-fired heater. The use of hot-oil heating rather than steam serves to further reduce the plant makeup-water requirements.

The design use of process steam in the plant has been held to a minimum. Other than a few small heating loads such as for the propane-dehydrator regeneration and steam tracing, the only major plant-heating load is for the amine reboiler. This was necessary because utilization of hot-oil heating for this service would result in high skin temperatures which would considerably increase corrosion in this reboiler. Other major plant uses for steam is in the still as the stripping medium. Total plant steam load will be approximately 16,500 lb. per hour. Two package-type 275-psi. boilers each capable of producing the design load will be installed; 250-lb. steam will be generated with a sizable portion of it being used to drive pumps exhausting at 125-psi. for process heating and stripping use.

Electrical and other services.—Four 500-kw. gas-engine-driven generators will supply all plant electrical-power requirements. One unit will serve as a spare with three units operating under normal conditions. Plant-power requirements were held as low as practicable by utilization of available energy from steam and from plant fuel gas. This latter was possible because of the process scheme involved wherein no gas stream is available from the process area at a low pressure. All plant fuel is derived from the 500-psi. absorber-residue gas.

A central-control house will be located in the center of the process area to house all controllers in this area. Instrumentation has been designed so that no hydrocarbons enter the control house. Bellows-type transmitters will be installed for flow requirements while all temperature controllers will be electronic instruments.

Organizational Setup

The Snyder gasoline plant is owned by 30 companies and 60 individuals who signed the construction and operating agreement effective July 1, 1950. The agreement provides the following:

Operator.—Sunray Oil Corp.

Advisory committee.—A seven-member body, consisting of operator (Sunray Oil Corp.), Fullerton Oil Co., Scurry Natural Gasoline Co., Lone Star Producing Co., Cities Service Oil Co., L. M. Lockhart, and Skelly Oil Co. The members of this committee are:

H. W. Manley, chairman, Sunray Oil Corp., Tulsa.

Robert Boykin, Fullerton Oil Co., Pasadena, Calif.

Max Lents, Scurry Natural Gasoline Corp., Houston.

J. M. Kindle, Lone Star Producing Co., Dallas.

Frank M. Perry, Cities Service Oil Co., Bartlesville, Okla.

J. C. Birdsall, L. M. Lockhart, Corpus Christi, Tex.

J. A. Craig, Skelly Oil Co., Tulsa.

The committee acts in an advisory capacity to the operator in accordance with the specified duties of the said committee outlined in the construction and operating agreement. Selection of the committee was on the basis that the companies having the four highest participation interests would have permanent representation. The remaining three memberships of the committee are made up of the operator of the plant, and the selection of two additional members chosen by minority participation interests in the plant.

The voting percentages of the committee are based on equal votes and not on the individual company's participation interest in the Snyder plant.

Contracts.—Purchase contract for the casing-head gas provides that the actual plant production determines the percentage of payment to the individual leases supplying gas to the gasoline plant. It provides for sale of gas and liquefied gas products under about the same terms as the conventional Natural Gasoline Association of America casing-head-gas contract. The residue gas may be used by the individual lessee operators for gas-pressure maintenance of their individual leases or for the field in an over-all cooperative pressure-maintenance project.

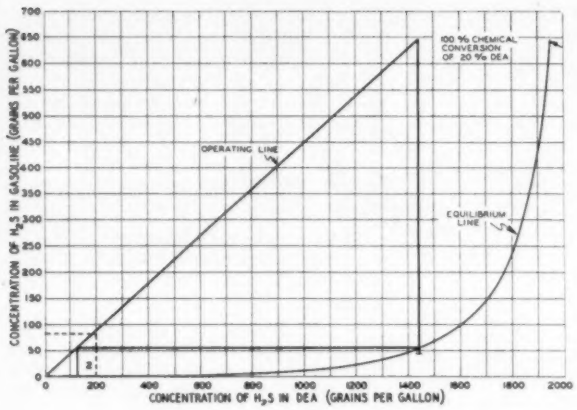
Basis of participation.—A method of participation in the investments and earnings is divided into two periods:

1. The preliminary participation period will be from the start of plant operations until September 1, 1952. The participation interest will be on the basis of surface acres of individual lessees' lease interest as it is to the total participation surface acreage within a defined area. Since a large amount of the field had not been drilled or had not been completely developed as of July 1, 1950, this feature of the participation interest on the preliminary basis permits all participants to have a period for completing drilling development of their productive leases supplying gas.

2. The permanent basis of participation shall be placed in effect as of September 1, 1952, and shall be based upon the value of the gas made available to the plant by each of the leases supplying gas to the plant during the 6-month period, beginning March 1, 1952, and ending September 1, 1952, which period is referred to as "the test period."

Each party's permanent participation interest shall be in proportion to the value that the participant's gas made available bears to the total gas made available by all the participating leases during said test period. For the purpose of this final participation determination, the value of each participant's gas shall be the sum of two quantities; that is, the value of natural gasoline contained in the gas and the value of the residue gas attributable being produced from each participant's lease. Therefore, the value of the gas made available by each participant shall be the sum of the natural-gasoline values and residue gas values made available to the plant for processing during the permanent test period, as provided for in the operating agreement for allocation of final participation ownership in this project.

Construction and engineering design of the compression and processing part of the Snyder plant are by Fluor Corp., Ltd. The majority of the camp houses have been constructed under contract by Whitmor Homebuilders, Inc., Tulsa. The low-pressure gas-gathering system construction has been done by Vaughan & Taylor Pipe Line Contractors, Wichita Falls. The high-pressure gas-gathering pipe-line construction was done by Holder Construction Co., Snyder. The office building was constructed under contract by Kelley-Coppedge Co.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EQUILIBRIUM LINE
CONCENTRATION OF H_2S IN GASOLINE (GRAINS PER GALLON)
CONCENTRATION OF H_2S IN DEA (GRAINS PER GALLON)

Fig. 1—Calculated curve for absorption of H_2S by DEA, based on 100 per cent conversion of 20 per cent DEA solution.

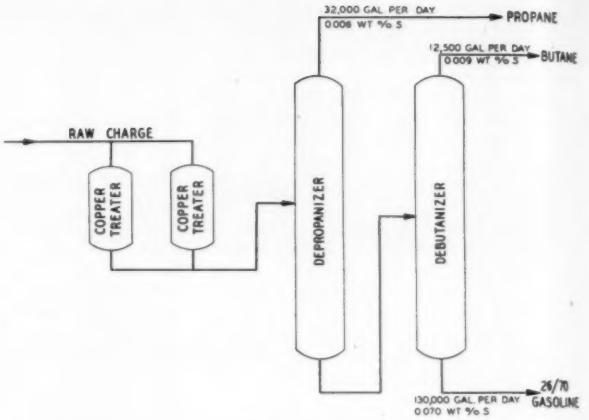

Fig. 3—Flow scheme of copper sweetening prior to fractionation. This method is employed in a West Texas plant.

Practical and economic

TREATING SYSTEM

for an average gasoline plant

by G. M. Brooner*

FOR the present discussion, it is assumed that the normal products of a gasoline plant are propane, butane, and grade natural gasoline. The production of isobutane or special products, however, may have considerable effect on the over-all treating facilities and where planned must be given proper consideration. The treatment of these products is almost exclusively confined to the removal of hydrogen sulfide and free sulfur and either the removal or conversion of any mercaptan sulfur which may be present. To accomplish this, a rather wide selection of processes is available and should be evaluated by the natural-gasoline-plant operator, who must also choose the proper location of these facilities in his processing sequence.

When a new gasoline plant is to be built, the over-all treating requirements for the desired products and specifications are first considered; then, the process or processes necessary to meet these requirements with a minimum of investment and operating cost can usually be selected. In existing plants, however, as capacity additions are made or as problems requiring treating facilities arise, it is frequently necessary to utilize such facilities as may already be available or to add additional facilities as may be most easily or quickly installed.

There are a number of well-known and well-established operations for handling all of the above sulfur compounds, any one of which may be preferable or most economical for a given treating problem, depending on conditions existing at the particular plant. This article will review briefly the better-known operations and their application and possibly contribute a few ideas which may be new or not too well known to some.

*Phillips Petroleum Co. Presented at Natural Gasoline Association of America regional meeting, Big Spring, Tex.

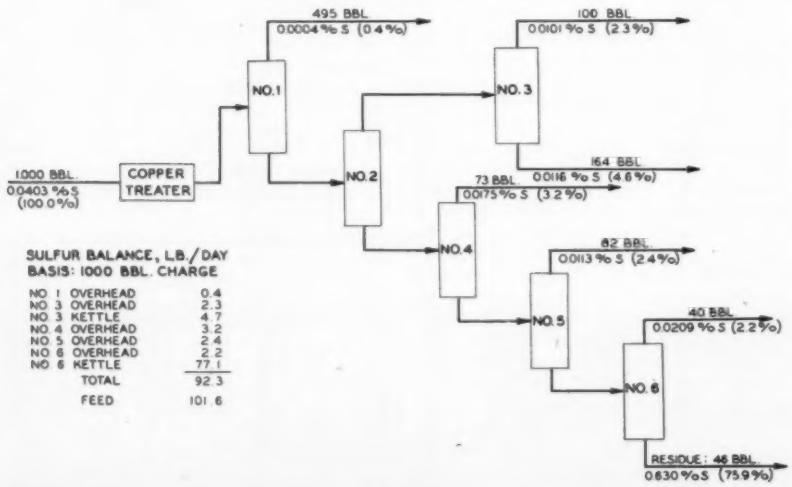

Fig. 2—Material balance and fractionation sequence for processing copper sweetened natural gasoline.

Hydrogen Sulfide

The development and extensive use of amine solutions and similar processes for removal of hydrogen sulfide from the inlet gas prior to absorption has greatly simplified the problem of handling hydrogen sulfide in the liquid products. Usually, however, in plants where hydrogen sulfide is present in the incoming gas, some treating facilities are still required to clean up the hydrogen sulfide which may not have been completely removed in the gas-treating process and to protect against operational upsets in this equipment.

Generally speaking, hydrogen sulfide should be removed as early as possible in the processing operations to protect against corrosion which always exists when hydrogen sulfide is present. However, in most cases, where the inlet gas is treated for hydrogen sulfide removal, any hydrogen sulfide remaining in the depropanizer feed is removed in the propane overhead product. Here, then, is the most convenient point to locate the additional treating facilities because of the relatively smaller vol-

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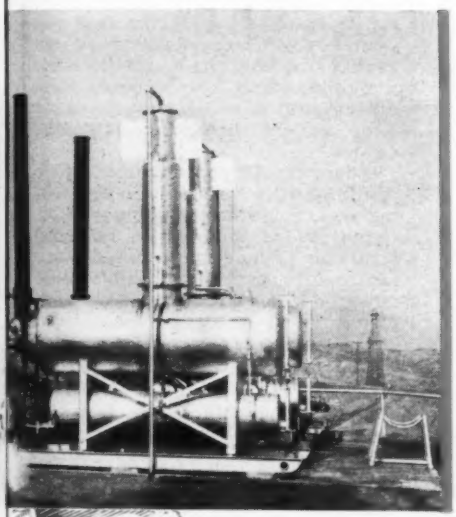

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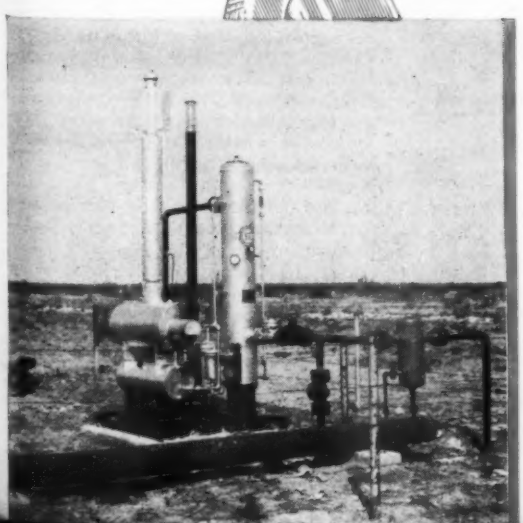

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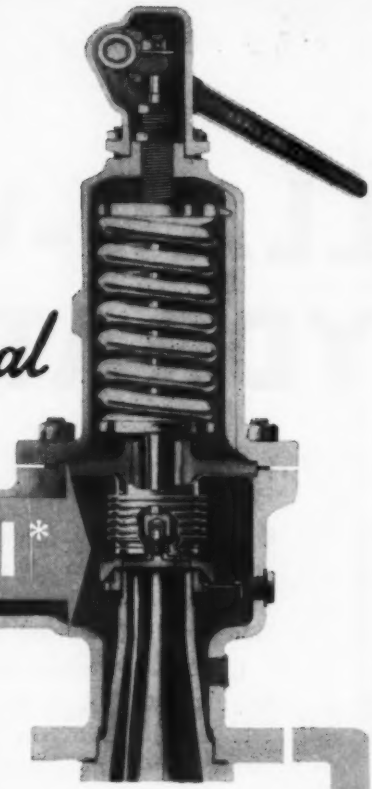

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ume and the consequent reduction in equipment required.

The most common means for removing hydrogen sulfide from liquids is the ordinary caustic wash. This operation is well adapted for handling propane or other products in which hydrogen sulfide may occur. The equipment required is extremely simple, consisting only of a settling tank from which the caustic is recirculated and means for mixing the caustic and hydrocarbon product. The mixing may be accomplished either by centrifugal pump, eductors, or the ordinary spider whichever may best fit the conditions at hand. Ordinarily, elaborate mixing facilities are not required where only hydrogen sulfide is to be removed.

The principal disadvantages of the caustic wash for hydrogen sulfide removal are the cost of the caustic soda and in many locations the increasing difficulty of satisfying the antipollution laws governing disposal of spent caustic solution. It is best utilized, therefore, where the amount of hydrogen sulfide to be removed is not large and the chemical costs not excessive.

Where caustic consumption is high, resulting in a relatively high treating cost, some economy may be effected through the use of two-stage scrubbing. Where only a single-stage scrubber is used, the caustic solution must be changed before it is completely spent to avoid breakthrough of hydrogen sulfide; whereas, if a second stage is added almost theoretical caustic efficiency may be realized.

The use of sand filters following the caustic wash is too frequently overlooked in this type of operation. Sand filters are particularly desirable to remove any traces of caustic carryover where additional processing such as dehydrating or copper treating follows the caustic wash. In many cases the size of the caustic settling vessel may be reduced by following with a sand filter to remove carryover which may result from reduced settling time.

Another means for removing hydrogen sulfide from liquid products is the use of amine solutions, which has only recently come into use and is not well known. Although the hydrogen sulfide removal is not 100 per cent complete and a followup caustic wash is still required, this process offers many advantages over the use of straight caustic washing. This is especially true where the amount of hydrogen sulfide to be removed is large or where an amine gas treater is already in operation and the existing regeneration facilities can be used for both the gas-treating and liquid-treating operations.

One suitable unit for treating liquid propane with diethanolamine solution includes scrubbing in a vertical tower packed with carbon raschig rings. The lean amine solution can be taken from a unit originally installed for gas treating.

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sider amine-treating facilities, Fig. 1 shows a calculated curve for the absorption of hydrogen sulfide by diethanolamine, based on 100 per cent conversion of a 20 per cent DEA solution. Although this is a calculated curve, experimental data indicate it can be used in the design of absorption equipment. It is noted that a single-stage contact is not quite sufficient although a second stage brings the removal below the accuracy of the curve. It appears that the amine scrub should be followed by a caustic wash to remove final traces of hydrogen sulfide.

Some use has been made of other gas-treating processes (such as tripotassium phosphate) in the treatment of liquid products, but we have no information on these operations.

Free Sulfur

It is fortunate that free or elemental sulfur is not frequently encountered, since its removal from hydrocarbon products is in many cases one of the most difficult treating problems. It can be efficiently removed, though, by use of a caustic-polysulfide solution if the equipment is properly designed and operated. The equipment requirement is similar to that used in the ordinary caustic-washing operation.

Particular attention must be given to contacting of the polysulfide solution with the hydrocarbon. When degree of mixing obtained in the usual jets, orifices, and spiders is not sufficient, a centrifugal mixing pump is essential. A low-efficiency open-impeller pump is preferable although a closed-impeller type may be used if the clearances are increased and the efficiency lowered. The Goulds Type 3158 or equal has been found to give good mixing service for butane and heavier products. For propane the Goulds Type 3460 or equal has been used with good results although this pump does not have an open impeller and it is necessary to open up the clearance and operate at about 40 per cent efficiency.

As in the usual caustic-scrubbing operation, the mixing pump takes suction on both the oil and the polysulfide solution discharging the mixture into the settling tank from which the polysulfide is recirculated. The fresh solution may be prepared by dissolving 1 lb. of commercial (50-60 per cent) sodium sulfide and 0.1 lb. of flowers of sulfur in each gallon of approximately 15° B. caustic solution. It is very important that the flowers of sulfur be completely dissolved, otherwise the gasoline will come from the treater more corrosive than it was originally.

In removing free sulfur, the solution is most active at a polysulfide concentration of approximately $Na_2S_{3.5}$ and rapidly loses its affinity for elemental sulfur when the polysulfide concentration passes $Na_2S_{3.5-4}O$. When the solution requires replacement, not more than 80 per cent of the polysulfide solution in the system should be discarded and the volume made up with fresh sodium sulfide-caustic solution.

The old solution left in the system will "seed" the fresh caustic-sulfide solution making it unnecessary to add any flowers of sulfur to the new solution. Partially spent caustic, if available, may be utilized for making up the solutions. A ratio of approximately 60 per cent hydrocarbon and 40 per cent polysulfide solution should be maintained at the pump discharge for maximum sulfur-removal efficiency.

Where mercaptans are also present with free sulfur, it is possible to eliminate the sulfur by a wash with ordinary doctor solution, the free sulfur being consumed in converting the mercaptans to disulfides in the doctor sweetening reaction. The principal disadvantages of this operation is that if the amount of mercaptans present is more than required for the elemental sulfur present, additional sulfur must be added to obtain the doctor solution "break." This requires constant attention and frequently results in too much sulfur being added. Then the treated product is just as corrosive as before treating.

The doctor solution must also be regenerated periodically. Free sulfur is usually found in kettle products and the best treating method is to avoid its formation which is almost

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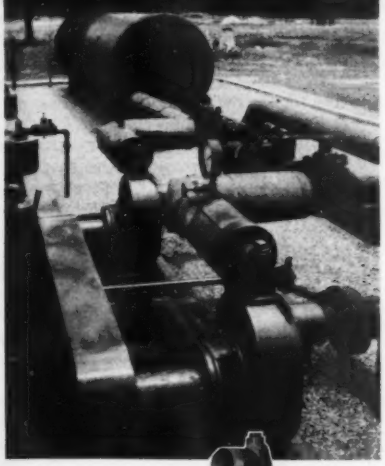

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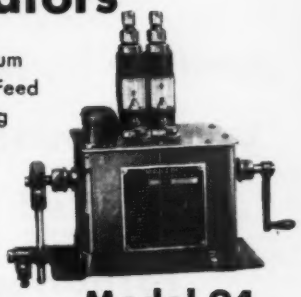

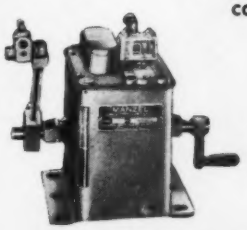

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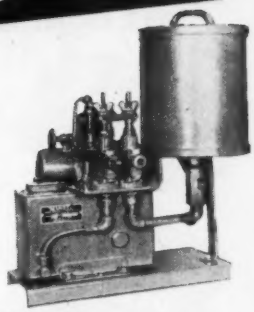

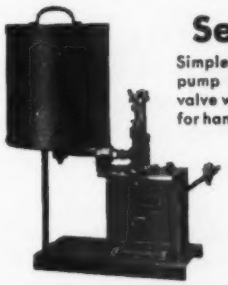

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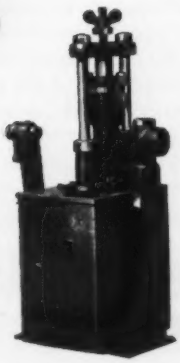

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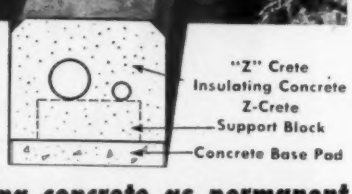

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always caused by air coming in contact with products containing hydrogen sulfide.

Mercaptan Sulfur

Processes for the treatment of gasoline containing mercaptan sulfur compounds fall generally into two classes: (1) Those which remove the mercaptans from the gasoline thereby lowering the total sulfur content, and (2) the so-called sweetening processes in which the mercaptan sulfur is converted to the disulfide, which is odorless.

The first class, those processes which actually remove the mercaptan sulfur compounds, comprises either the ordinary regenerative-type caustic wash or some modification thereof in which some agent is added to increase the solubility of mercaptans in the caustic. The latter modifications are not used extensively in the natural-gasoline industry since the light or low-molecular-weight mercaptans normally found in natural gasoline are readily removed by the ordinary regenerative caustic wash and the addition of solutizing agents does not give sufficiently improved results to merit their use.

The regenerative caustic wash has been described in the literature on numerous occasions. Its principal advantage is the ability to handle products of extermely high mercaptan contents and to reduce the total sulfur content of treated products by the extent of the mercaptan sulfur removed. The latter factor is usually of importance only on L.P.G. products or where the sulfur content of the natural gasoline is unusually high. The disadvantages of the regenerative caustic wash processes for the average treating load are the increased investment and operating costs when compared to sweetening processes.

Also in those cases where the mercaptan content is such that the reduction in total sulfur achieved by a regenerative caustic wash would be an important factor, there may be sufficient other sulfur compounds present in the gasoline to justify consideration of catalytic desulfurization. Such processing of high-sulfur natural gasoline to improve the TEL susceptibility may assume greater importance in the future as many refiners find increasing difficulty in meeting octane specifications.

A regenerative caustic wash should preferably be installed ahead of the depropanizer or debutanizer, thereby eliminating the need for further treatment of the propane and butane L.P.G. products. Where a completely doctor-sweet grade natural gasoline is required, however, it is usually necessary to add facilities for sweetening this stream. When hydrogen sulfide is present in the feed to a regenerative caustic wash, it is necessary to install an ordinary caustic scrubber for its removal prior to the regenerative caustic treatment.

Several sweetening processes are available for the treatment of mercaptans in natural gasoline, including the doctor process, hypochlorite process, and the copper-sweetening process. The copper-sweetening process, and particularly, the solid treating modification, is most widely used in the natural-gasoline industry. The great advantage of this process over the regenerative caustic wash as well as other sweetening processes is the relatively minor investment required and the simplicity of the operation, resulting in a low treating cost per gallon.

The principal limitation of the solid copper-sweetening process, insofar as the natural-gasoline industry is concerned, is the amount of mercaptan sulfur present in the feed which can be satisfactorily handled. Although units are in operation on stocks having in excess of 0.1 weight per cent mercaptan sulfur, it is recommended for best operation that the feed be limited to a mercaptan sulfur content not exceeding 0.05 weight per cent. Where the feed stocks will contain mercaptan sulfur in excess of that amount, it is recommended that regenerative caustic-wash facilities be installed to reduce the mercaptan sulfur to at least this amount prior to the sweetening operation.

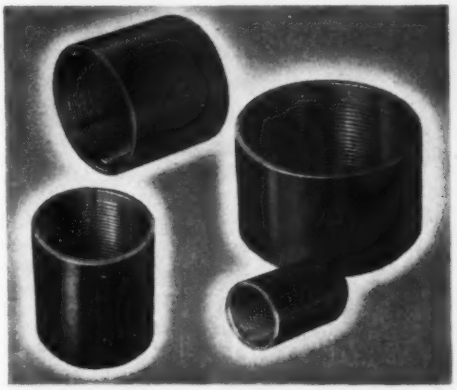
Sweetening units may be located on the individual butane and natural-gasoline streams or on the debutanizer feed although the latter is not usually recommended except in instances requiring special consideration. In most plants only the natural gasoline is sweetened, or the natural gasoline and butane streams are sweetened individually. There are appreciable advantages, however, in treating the combined streams that may not have been fully evaluated.

Disulfide sulfur compounds formed from any given mercaptan in the sweetening reaction always have a higher boiling point than the corresponding mercaptan. Since mercaptans are the only sulfur compounds, other than hydrogen sulfide, found in the lower-boiling hydrocarbons, sweetening prior to the separation of these lower-boiling products converts the mercaptans into higher-boiling compounds which will remain in the final kettle product, thereby eliminating the necessity for treating the overhead products and also producing an essentially sulfur-free overhead material. This is best illustrated by the data shown in Fig. 2.

Fig. 2 illustrates part of the fractionation sequence in one of the Phillips plants where a natural-gasoline stream is copper treated prior to fractionation. It also illustrates the fractionation sequence employed and shows a material balance around the unit. The feed to the copper treater contains 0.04-0.05 weight per cent total sulfur of which approximately 50 per cent is mercaptan sulfur. The doctor-sweet product from the copper treater is charged to tower No. 1. Half of the charge is removed as an overhead stream which has a total sulfur content of only 0.0004 weight per cent. The kettle product from this column is further fractioned into five products having total sulfur contents ranging from 0.0101 to 0.0209 weight per cent and a final kettle product with a total sulfur content which may vary from 0.5-1.0 weight per cent. It will be noted that in this particular survey 76 per cent of the total sulfur originally present was concentrated in a final kettle product representing less than 5 per cent of the charge.

In this particular study, the calculated total quantity of sulfur present in the products accounts for only 91 per cent of that in the original feed. The difference is due to the fact that the sulfur analyses of each stream are taken from spot checks while the product ratios are based on monthly averages. Even so, these data indicate very forcibly the desulfurization which may be obtained from sweetening prior to product fractionation.

While this example represents a rather extensive fractionation procedure, the same effect may be obtained in simpler operations. Copper sweetening prior to debutanization, for instance, will produce an essentially sulfur-free butane overhead which requires no further treatment. Fig. 3, for example, shows schematically



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98 YEARS IN PENNSYLVANIA'S CAPITAL

the treating and fractionation employed in a West Texas gasoline plant. The solid copper-sweetening units are located ahead of the depropanizer, thereby producing low-sulfur propane and butane products requiring no further treatment.

In many plants, only propane and butane are produced as finished products and the grade natural-gasoline production is moved through crude-oil pipe lines where a sweet product is not necessary. In such cases, the butane only may be sweetened where the mercaptan content is not so large as to result in an excessive total sulfur content of the finished butane. If the mercaptan content of such streams is in excess of total sulfur specifications, then some type of caustic-wash facilities will be required. The economics in these instances may sometimes justify a simpler treating system such as solid copper sweetening on the total butane and heavier production. In some plants, a satisfactory product has been obtained by copper sweetening the butane; subsequently, it is flashed or revaporized in order to leave the high boiling sulfur compounds in the flash drum.

Since copper - sweetening facilities are used in many plants, it might be well to mention very briefly a few of the more special operating problems which may be encountered. The usual operating difficulty on these units is the accumulation of water in the sweetening reagent caused by the higher mercaptan contents of many West Texas gasolines. Water is formed as a byproduct in the sweetening reaction and that portion which is not soluble in the gasoline leaving the treater will accumulate in the sweetening reagent.

The water tolerance limits of the reagent are approximately 9-28 weight per cent. When the water content exceeds the upper limit due to accumulation from the sweetening reaction, the gasoline will gradually become doctor sour. At this point, it is necessary to switch to the standby tower, remove the reagent and dry it in some manner. Since the solubility of water in gasoline increases with temperature, this accumulation can be slowed down or in many cases completely prevented by operating at a higher temperature. This can be accomplished either by bypassing a portion of the cooling equipment or installing heating means such as a steam exchange on the treater feed. Some trial-and-error operation will be required to determine the optimum operating temperature, but it is recommended that the treating temperature never exceed 125° F.

Another problem attendant with the increase in moisture content of the reagent is corrosion of the treating vessel itself. The various lacquers and paints which have been suggested for painting these vessels are the best that have been found but are not completely satisfactory and give only temporary protection. Where corrosion is a really critical item in the operation of these units, it has been found that lining the vessel with Saran gives perfect protection.

Saran is a synthetic resin and is applied to the interior of vessels in sheets approximately ¼ in. thick. It is completely resistant to the corrosive action of copper and only one instance has been reported of even minor difficulty with linings of this material. The only disadvantage in its use is the cost which is presently in the neighborhood of $1,100 per vessel. It is not recommended therefore for new installations but only in those cases where operating experience has shown corrosion to be a critical item.

In summary, here are the basic requirements for an adequate natural gasoline plant treating system:

1. Elimination of hydrogen sulfide as early as possible to prevent equipment corrosion.
2. Production of specification doctor-sweet and noncorrosive products.
3. Operation with a minimum of chemical cost and attention from plant personnel.

To achieve these will naturally require careful consideration for each plant taking into account such factors as products and product specifications, nature and quantity of sulfur compounds present and any special plant or operating conditions which may exist.

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Hart's is a better load equalizer for oil field, industrial, and marine engines. The Hart Control is a patented, precision instrument of all metal construction and will last in the field indefinitely. It is easy to install and maintain. There are no diaphragms to deteriorate or replace. If you operate, in compound, two or more gas or gasoline engines you'll save time, money and increase your operating efficiency with a Hart Vacuum Control.

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Can be easily installed on location by an average mechanic.

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ODESSA, TEXAS

SURVEY OF NATURAL-GASOLINE PLANTS

Compiled by The Oil and Gas Journal's Statistical Department

CAPACITY rating on all operating natural-gasoline plants in the United States for this year is 13.9 per cent above that of 1950. A substantial portion of this increase is due to new plants which have been placed in operation during the past year and to other new installations which are scheduled to go on stream in the early months of this year. Expansion of existing installations accounted for the balance of the increase.

Texas, which again ranks first in total number of plants and capacity, shows an increase of nearly 5,000,000 gal. per day of liquid production capacity, a gain of about 42 per cent in the 1950-51 period. California occupies second place with Oklahoma in third position on a total-capacity basis, as was the case for last year. However, these positions are reversed in regard to number of operating plants in the respective states, this year as well as for 1950; Oklahoma having only one plant more than California.

This year's survey shows a net gain of 16 plants above the previous year for the entire United States. Texas leads with an increase of over 6 per cent or 11 more natural-gasoline plants than were reported on the Journal's 1950 survey.

SUMMARY OF NATURAL-GASOLINE PLANTS IN THE UNITED STATES—THEIR DISTRIBUTION AND CAPACITIES

	All plants*		Plants equipped only for production of natural gasoline		Plants equipped for production of natural gasoline and L.P.G.	
	No. of plants	Liquid prod. (cap. gal. per day)	No. of plants	Liquid prod. (cap. gal. per day)	No. of plants	Liquid prod. (cap. gal. per day)
Arkansas	8	326,000	1	10,000	7	316,000
California	70	3,862,200	34	933,800	36	2,928,400
Colorado	1	50,000	0		1	50,000
Illinois	8	551,550	2	1,750	6	549,800
Kansas	14	756,100	2	17,000	12	739,100
Kentucky	4	104,700	2	9,700	2	95,000
Louisiana	34	1,380,240	9	111,000	25	1,269,240
Michigan	1	5,000	1	5,000	0	
Mississippi	1	25,000	0		1	25,000
Montana	1	45,000	0		1	45,000
Nebraska	1	2,500	0		1	2,500
New Mexico	12	1,190,230	0		12	1,190,230
Ohio	5	23,550	5	23,550	0	
Oklahoma	71	2,406,000	23	299,600	48	2,106,400
Pennsylvania	18	87,190	17	77,690	1	9,500
Texas	178	13,863,400	56	1,875,650	122	11,987,750
West Virginia	45	507,400	39	206,650	6	300,750
Wyoming	8	283,600	3	22,100	5	261,500
Total	480	25,469,660	194	3,593,490	286	21,876,170

*Capacity for natural-gasoline manufacture only, plus capacity for natural-gasoline and L.P.G. manufacture.

ARKANSAS

Company, field or plant, and county—	Approx. prod. (gal. per day)
Arkansas Fuel Oil Co., Columbia, Columbia	*105,000
Arkla Oil Co., North Rodessa, Miller	*30,000
Hiwan Oil & Gas Co., Atlanta, Columbia	*25,000
Lion Oil Co., Schuler, Union	*35,000
Magnolia Petroleum Co., Kenova, Union	*6,000
Querbes, J. R., Oil Co., Southfield, Union	10,000
Shell Oil Co., Magnolia, Columbia	*85,000
Sunray Oil Corp., Midway, Lafayette	*30,000
Total	326,000

*Includes L.P.G.

CALIFORNIA

Company, field or plant, and county—	Approx. prod. (gal. per day)
Bankline Oil Co., Long Beach, Los Angeles	*17,000
Belridge Oil Co., North Belridge, Kern	*50,000
Brea Canyon Oil Co., Brea-Olinda, Orange	10,000
Coline Gasoline Co., Rincon, Ventura	*50,000
Continental Oil Co., Ventura, Ventura	*45,500
Cowan Oil & Ref. Co., Rosecrans, Los Angeles	10,000
Fullerton Oil Co., Huntington Beach, Orange	40,000
General Petroleum Corp.:	
Athens, Los Angeles (fractionating plant)	*210,000
Helm, Riverdale, Lanare, Fresno	*60,000
Santa Fe Springs, Los Angeles	50,000
Ventura, Ventura	40,000
Wilmington, Los Angeles	75,000
Honolulu Oil Corp.:	
Buena Vista Hills, Kern	30,000
Cymric, Kern	*45,000
Inglewood Gasoline Corp., Potrero, Los Angeles	5,500
Lomita Gasoline Co., Long Beach, Los Angeles	*110,000
Magruder, P. S., Operator:	
Kettleman Hills, Kings (Huffman plant)	*110,000
Kettleman Hills, Kings (Western plant)	*145,000
Norwalk Co.:	
Maricopa-Sunset, Kern	*17,000
Santa Fe Springs, Los Angeles	*16,500
Rice Ranch Oil Co., Orcutt, Santa Barbara	2,800
Richfield Oil Corp.:	
North Coles Levee, Kern	*142,000
Long Beach, Los Angeles	20,000
Russell Ranch, San Luis Obispo	*111,000
South Cuyama, Santa Barbara	*146,000
Shell Oil Co.:	
Brea, Orange	26,000
Capitan, Santa Barbara	*3,600
Dominguez, Los Angeles	12,000
Long Beach, Los Angeles	37,000
Santa Maria, Santa Barbara	1,500
Ten Section, Kern	*110,000
Ventura, Ventura	*180,000
Signal Oil & Gas Co.:	
Elwood, Santa Barbara	*25,000
Huntington Beach, Orange	*175,000
Signal Hill, Los Angeles	*75,000
Standard Oil Co. of California:	
Greeley, Kern	*60,000
Huntington Beach, Orange	*54,000
Inglewood, Los Angeles	35,000
(11-P) Kettleman Hills, Kings	50,000
(3-P) Kettleman Hills, Kings	*208,000
(33-J) Kettleman Hills, Fresno	50,000
Lost Hills, Kern	4,000
(1-C) Midway, Kern	*40,000
(7-D) Midway, Kern	33,000
(29-G) Midway, Kern	12,000
Murphy-Coyote, Orange	*120,000
(32-Z) Mountain View, Kern	16,000
Northeast Coalinga, Fresno	35,000
Santa Fe Springs, Los Angeles	40,000
Seal Beach, Los Angeles	30,000
Torrance, Los Angeles	12,000
Superior Oil Co., Rio Bravo, Kern	*16,800
Texas Co., The:	
Santa Fe Springs, Los Angeles	*36,000
Signal Hill, Los Angeles	*74,000
Shiells Canyon, Ventura	*50,000
Tide Water Associated Oil Co., Ventura Ave., Ventura	*150,000
Union Oil Co.:	
Brea, Orange	35,000
Coalinga Nose, Fresno	*43,000
Del Valle, Ventura	*45,000
Dominguez, Los Angeles	60,000
Orcutt, Santa Barbara	*35,000
Playa del Rey, Los Angeles	12,000
Richfield, Orange	13,000
Rosecrans, Los Angeles	27,000
Santa Fe Springs, Los Angeles	50,000
Santa Maria, Santa Barbara	*48,000

NATURAL-GASOLINE PLANT SURVEY

CALIFORNIA (Continued)

Company, field or plant, and county—	Approx. prod. (gal. per day)
Unit Operations Naval Petroleum Reserve No. 1 (Std. Calif. Operator), Elk Hills, Kern	5,000
West Coast Refining Co., Richfield, Orange	50,000
West Rosecrans Gasoline Co., Rosecrans, Los Angeles	5,000
Wilmington Gasoline Co., Wilmington, Los Angeles	*105,000
Total	3,862,200

*Includes L.P.G.

COLORADO

California Co., The, Rangely, Rio Blanco	*56,000

*Includes L.P.G.

ILLINOIS

Arkansas Fuel Oil Co., Robinson, Crawford	500
Brenneman & MacDowell, Condry, Crawford (2 plants)	1,250
Carter Oil Co., Louden, Fayette	*74,000
Engle Petroleum, Inc., Benton, Franklin	*10,000
Texas Co., The:	
Hoodville, Hamilton	*97,500
Salem, Marion	*168,300
Warren Petroleum Corp.:	
Crossville, White	*100,000
Salem, Marion	*100,000
Total	551,550

*Includes L.P.G.

KANSAS

Cities Service Oil Co. (Del.):	
Main Line, Sedgwick	*104,000
Main Line, Cowley	*30,000
Burrton, Reno	*30,000
Deerfield Petroleum, Inc., Hugoton, Kearny	*35,000
Edwards Gasoline Co., Zenith, Stafford	2,000
Flynn Oil Co., Otis, Rush	*7,000
Kansas P. & L. Co., Medicine Lodge, Barber	15,000
Magnolia Petroleum Co., Hickok, Grant	*85,000
Northern Natural Gas Co., Hugoton, Seward	*61,700
Panhandle Eastern Pipe Line Co., Hugoton, Seward	*63,000
Skelly Oil Co., Cunningham, Kingman	*30,000
Stanolind Oil & Gas Co., Hugoton, Grant	*†283,000
Sunray Oil Corp., Rainbow Bend, Cowley	*3,000
Texas Co., The, Atlanta, Cowley	*7,400
Total	756,100

*Includes L.P.G. †Increased capacity for 1951.

KENTUCKY

Ashland Oil & Refining Co., Big Sinking, Lea	1,700
Kentucky-West Virginia Gas Co., Big Sandy, Floyd	8,000
United Fuel Gas Co.:	
Leach plant, Boyd	*55,000
Warfield plant, Martin	*40,000
Total	104,700

*Includes L.P.G.

LOUISIANA

Company, field or plant, and parish—	
Anchor Gasoline Corp.:	
Eola, Avoyelles	*40,000
Pine Prairie, Evangeline	*15,000
Cheneyville, Rapides	6,000
Anse La Butte Gasoline Co., Anse La Butte, St. Martin	*12,000
Arkansas Fuel Oil Co.:	
Bisteneau, Webster	*33,000
Langston, Claiborne	5,000
North Ruston, Lincoln	*40,000
Rodessa, Caddo	*15,000
Shreveport, Caddo	*12,000
Sligo, Bossier	*18,500
Arkla Oil Co., North Rodessa	*30,000
Atlantic Refining Co., Neale, Beauregard	*82,740
California Co., Hico Knowles, Lincoln	*185,000
Carter Oil Co., Stiles, Caddo	*5,000
Claiborne Gasoline Co., Lisbon, Claiborne	*150,000
Coltexo Corp., Rodessa, Caddo	*50,000
Continental Oil Co.:	
Gillis, Calcasieu	10,000
Tepetate, Acadia	12,000
Ville Platte, Evangeline	*100,000
Glen Rose Gasoline Co., Rodessa, Rodessa	*50,000
Great National Oil Corp. of Louisiana, Ida, Caddo	35,000
Gulf Refining Co., Homer, Claiborne	10,000
Humble Oil & Refining Co., St. Landry†	*110,000
Hunt Oil Co., Lisbon, Claiborne	*70,000
Magnolia Petroleum Co., Mamou, Evangeline	*35,000
Ohio Oil Co., Hayesville, Claiborne	*3,000
Shell Oil Co., Iowa, Calcasieu	15,000
Stanolind Oil & Gas Co., Pine Island, Caddo	4,000
Sun Oil Co., Delhi, Richland	*82,000
Sunray Oil Corp., West Tepetate, Jefferson Davis	*32,000
Texas Co., The, Lafitte, Jefferson	14,000
United Gas Pipe Line Co.:	
Koran plant, Webster	*22,000
Rodessa plant, Caddo	*54,000
Sugar Creek, Claiborne	*23,000
Total	1,380,240

*Includes L.P.G. †On gas line.

MICHIGAN

Company, field or plant, and county—	
Sun Oil Co., Kimball Lake, Newaygo*	5,000

*Compressor station.

MISSISSIPPI

California Co., Brookhaven, Lincoln	*25,000

*Includes L.P.G.

MONTANA

Union Oil Co. of California, Cut Bank, Glacier	*45,000

*Includes L.P.G.

NEBRASKA

Ohio Oil Co., Huntsman, Cheyenne	*†2,500

*Includes L.P.G. †Under construction.

NEW MEXICO

Coronado Gas Corp., Loco Hills, Eddy	*25,000
El Paso Natural Gas Co.:	
Jal, Lea Plant 1	*337,380
Jal, Lea Plants 2 and 3	*202,500
San Juan County	*†54,350
Gulf Oil Corp., Drinkard, Lea	*126,000
Frontier Natural Gasoline Co., Eddy County	*30,000
Maljamar Coop., Maljamar, Lea	*23,000
Phillips Petroleum Co.:	
Eunice, Lea	*102,000
Hobbs, Lee, Lea	*85,000
Skelly Oil Co., Eunice, Lea	*130,000
Southern Union Gas Co., Kutz Canyon, San Juan	*25,000
Warren Petroleum Co., Monument, Lea	*50,000
Total	1,190,230

*Includes L.P.G. †Under construction.

OHIO

East Ohio Gas Co., Cuyahoga County	2,550
Ohio Fuel Gas Co.:	
Ashland, Richland	6,000
Medina, Medina	5,000
Sugar Grove, Fairfield	6,000
River Gas Co., Ludlow, Monroe	4,000
Total	23,550

OKLAHOMA

Anchor Gasoline Corp., Coyle, Payne	*6,000
Apache Gasoline Co., Apache, Caddo	*10,000
Barksdale Co., Barksdale, Hughes	500
Carter Oil Co.:	
Fitts, Pontotoc	*50,000
Seminole, Seminole	*85,000
Cimarron Gasoline Corp.:	
Coyle, Logan	10,000
Guthrie, Logan	15,000
Cities Service Oil Co. (Del.):	
Oklahoma City, Oklahoma	*20,000
Guymon, Texas	11,000
Tallant, Osage	10,000
Sasakwa-Fish, Seminole	4,500
Continental Oil Co.:	
Billings, Noble	*13,000
Tonkawa, Kay	10,000
Crosbie, J. E., Inc.:	
Fitts, Pontotoc	*18,000
Happy Valley, Lincoln	*12,000
Milfay, Creek	*20,000
Devonian Oil Co., Kellyville, Creek	*20,000
Eason Oil Co., Crescent	*40,000
Frame Natural Gasoline Co., Pawnee	2,000
Grimes Gasoline Co.:	
Wetumka, Hughes	*15,000
Coon Creek, Oklahoma	*12,000

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Eaton 2-Speed Axles give you both pulling power and speed in the same vehicle—instantly available to meet every specific operating need. Your trucks do more jobs, make faster trips. With Eaton 2-Speed Axles, engines run at most efficient and economical speeds; operating and upkeep costs are reduced to a minimum; thousands of miles are added to vehicle life. And Eaton's planetary design adds thousands of miles to *axle* life. Gear tooth loads are better distributed; gear speeds are slower; stress and wear are reduced to a minimum. Eaton 2-Speed Axles are available for most trucks of the 1½-ton class and larger. Ask your truck dealer for a road demonstration.

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and year after year — high pressure gas will be delivered from this plant to cross-country gas pipe lines. The plant units to compress the inlet gas, remove hydrogen sulphide, extract and fractionate substantially all propane and heavier hydrocarbons, and remove water vapor from the remaining gas are integrated in process design, in layout, and in execution of detail to produce a smoothly functioning complete plant requiring minimum maintenance and operating expense.

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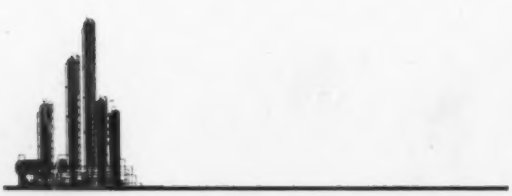

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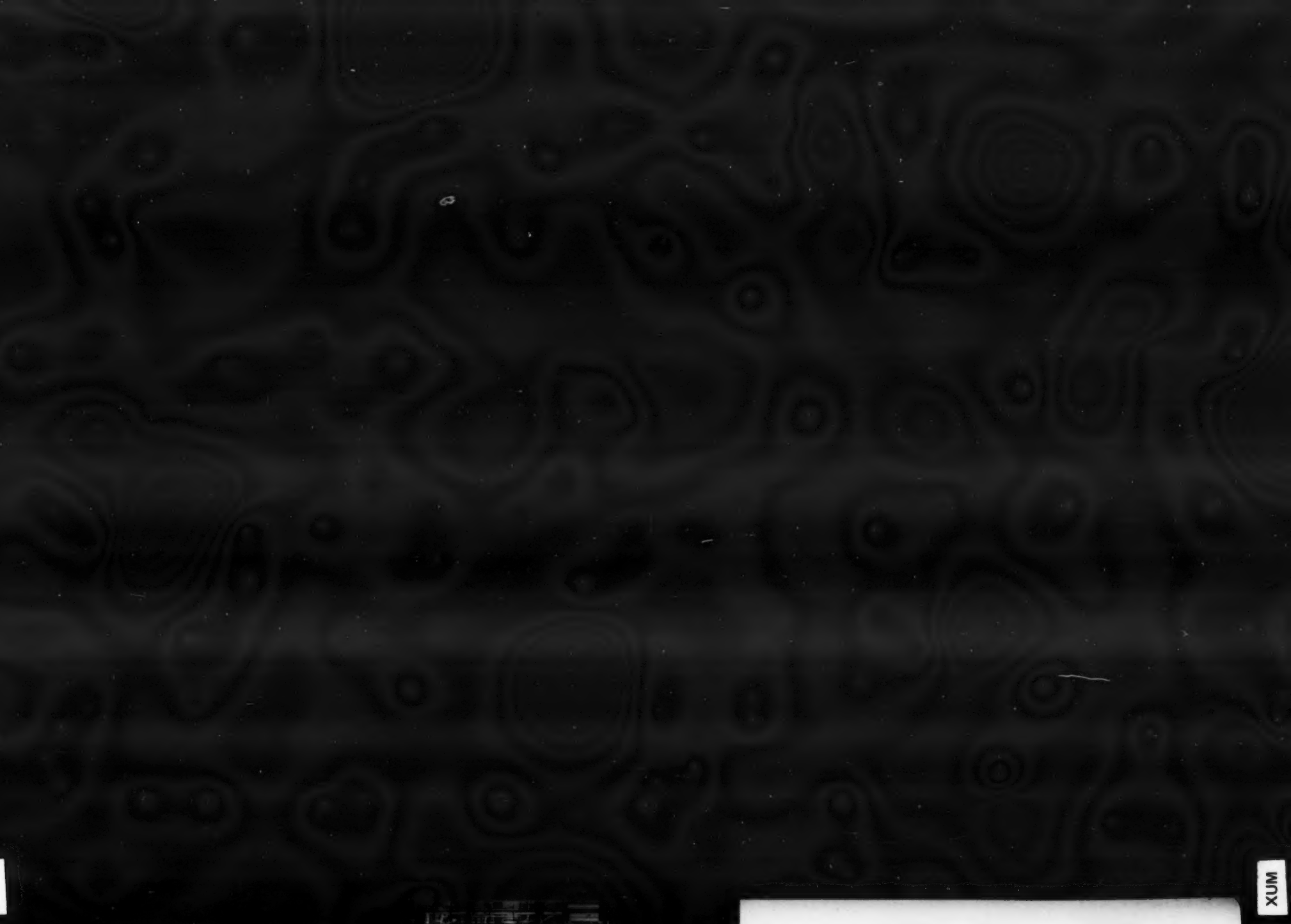

XUM

XUM

OKLAHOMA (Continued)

Company, field or plant, and county—	Approx. prod. (gal. per day)
Grimes, Chas. W. and Otha H.:	
Okemah, Okfuskee	1,000
Weleetka, Okfuskee	*12,000
Grimes, Otha H., Pauls Valley, Garvin	*30,000
Gulf Oil Corp.:	
Kiefer, Creek	*28,000
Mission, Seminole	*10,000
Keener Oil & Gas Co., Custer	*49,000
Lone Star Gas Co., Hollis, Harmon	*20,000
Magnolia Petroleum Co.:	
Davenport, Lincoln	*3,600
Graham, Carter	*20,000
St. Louis, Pottawatomie	*16,000
Sholem Alechem, Stephens	*90,000
Mid-Continent Petroleum Corp.:	
Cromwell, Seminole	*20,000
Drumright, Creek	*9,000
Ramsey, Payne	*6,500
Walnut Grove, Okfuskee	*5,000
Neal Gasoline Co., Osage, Osage	5,400
Panoma Corp., Guymon-Hugoton, Texas	*130,000
Patton & Swab, Inc., Edmond	*7,500
Peppers Refining Co., Oklahoma City	20,000
Phillips Petroleum Co.:	
Burbank (Denoya), Osage	*44,000
Burbank (Reserve), Osage	*16,000
Edmond, Oklahoma	*200,000
Edmond (Huntington), Oklahoma	*65,000
Oklahoma City, Oklahoma	*55,000
Wewoka, Seminole	*21,000
Pioneer Corp., Bixby, Tulsa	1,000
Powers, M. F., Depew, Creek	2,000
Pure Oil Co., Glenn Pool, Creek	7,200
Shell Oil Co.:	
Healdton, Carter	12,000
Hewitt, Carter	*20,000
Lucien, Noble	*30,000
Osage, Osage	10,000
Tonkawa, Noble	10,000
Sinclair Oil & Gas Co.:	
Covington (6), Garfield	*85,000
Drumright (2), Creek	60,000
Seminole (13), Seminole	*210,000
Seminole (12), Seminole	50,000
Shamrock (3), Creek	20,000
St. Louis (14), Pottawatomie	30,000
Skelly Oil Co.:	
Burbank, Osage (3 plants)	*85,000
Velma, Stephens	*50,000
Sunray Oil Corp.:	
Avant, Osage	2,000
Seminole-Earlsboro, Pottawatomie	*28,000
Texas Co., The:	
Davenport, Lincoln	*20,000
Glenn Pool, Creek	6,000
Osage, Osage	*3,700
Universal Gasoline Co., Aylesworth, Marshall	*5,500
Warren Petroleum Corp.:	
Madill, Marshall	*60,000
Maud, Pottawatomie	*30,000
Mayesville, Garvin	*300,000
Total	2,406,000

*Includes L.P.G.

PENNSYLVANIA

Company, field or plant, and county—	Approx. prod. (gal. per day)
Bayliss & Bayliss, Titusville	10,000
Clinger Oil & Gas Co.:	
Tidioute, Fagundus	1,000
Tidioute, Hastings	1,000
Crawford & Gregory, Venango County	140
Ellenburger, W. J., & Sons, Karns City	300
Equitable Gas Co., Rogersville, Greene	10,000
Haskell, Roth & Bayliss, Tidioute, Warren	10,000
Mars Co.:	
Lewis Run, McKean	6,500
Pinegrove, Venango	4,000
Van, Venango	*9,500
Pennsylvania Oil Co., Sheffield, Warren	10,000
Peoples Natural Gas Co., Brave, Greene	20,000
Quaker State Oil Refining Co., McDonald, Allegheny	2,500
Surety Oil Co.:	
Tiona, Warren	500
Titusville	1,000
Trueman's Forrest	150
Warner-Caldwell Oil Co., Titusville, Crawford	500
W. Paul Wible, Butler County	100
Total	86,190

*Includes L.P.G.

TEXAS

Company, field or plant, and county—	Approx. prod. (gal. per day)
Abercrombie Co., J. S., Old Ocean, Brazoria	*315,000
American Republics Corp., Houston:	
Selsbee, Hardin	*120,000
Joe's Lake, Tyler	16,000
Anzak Oil Corp., Overall, Coleman	250
Arkansas Fuel Oil Co.:	
Carthage, Panola	*30,000
Panola, Panola	*125,000
East Texas, Gregg	*90,000
Smithland, Marion	5,000
Rodessa (Jefferson area), Marion	*30,000
Waskom, Harrison	*157,000
Atlantic Refining Co., Block 31, Crane	†20,000
Barnhart Hydrocarbon Corp., Barnhart, Reagan	*90,000
Bennett Oil & Refining Co., Refugio, Refugio	20,000
Big Lake Oil Co., Big Lake, Reagan	3,500
Cabot Carbon Co.:	
Estes, Winkler	*30,000
Kermit, Winkler	*50,000
Keystone, Winkler	20,000
Canadian River Gas Co., West Panhandle, Moore	50,000
Cannon Gasoline Co., Panhandle, Potter	*17,500
Carthage Corp., Carthage, Panola	396,000
Caska Corp., Quitman, Wood	*15,000
Chicago Corp., The, Carthage, Panola	*300,700
Cisco Hydrocarbon Corp., Curry, Stephens	*40,000
Cities Service Oil Co. (Del.):	
Chico, Wise	*34,000
Pampa, Gray	*50,000
Coltexo Corp., Panhandle, Gray	35,000
Columbian Gasoline Corp., Wheeler, Wheeler	25,000
Consolidated Gasoline Co., Martin, Eastland	4,000
Continental Oil Co.:	
K.M.A., Wichita	140,000
Rincon, Starr	*31,500
Todd Ranch, Crockett	*85,000
Del Rey Petroleum Co., Chesterville, Colorado	*50,000
Duval Gasoline Co., Benavides, Duval	14,400
El Paso Natural Gas Co., Sealy-Smith, Ward	*41,750
E. Texas Prod. Gas., Chapel Hill, Smith	†20,000
Fullerton Oil Co., Fullerton, Andrews	120,000
Gregg-Tex Gasoline Corp., East Texas, Gregg	*150,000
Grimes, Otha H., Eskota, Fisher	8,000
Gulf Oil Corp.:	
East Texas, Gregg	*168,000
East Texas, Rusk	*42,000
North Ward-Estes, Crane	22,000
Sand Hills, etc., Crane	*95,000
Henderson Trust No. 2, W. Panhandle, Hutchinson	40,000
Hilander Gasoline Co., Rogers, Montague	12,000
Huber, J. M., Corp., Panhandle, Hutchinson	30,000
Humble Oil & Refining Co.:	
East Texas, Rusk (3 plants)	*183,000
Anahuac, Chambers	45,000
Clear Lake, Friendswood, Harris	*35,000
Conroe, Montgomery	*90,000
Flour Bluff, Nueces	8,100
Heyser, Calhoun	7,300
Jourdanton, Atascosa	*39,000
Pickton, Hopkins	*34,000
Tomball, Harris	30,000
Tom O'Connor, Refugio	*26,000
Hunt Oil Co., Harleton, Harris	*30,000
La Gloria Corp., La Gloria, Jim Wells	*50,000
Lion Oil Co., Diamond M, Scurry	*‡313,500
Lisbon Gasoline Co., East Texas, Rusk	*100,000
Lone Star Gas Co.:	
Gordon, Palo Pinto	*45,000
Pueblo, Eastland	7,000
Trinidad, Henderson	*80,000
Lone Star Producing Co.:	
Brooks, Stephens	25,000
Ranger, Eastland (fractionating plant)	*75,000
Plant 108, Eastland	60,000
Lyman, C. V., Gasoline Co., Emperor, Winkler	*20,000
Magnolia Petroleum Co.:	
Burkburnett, Wichita	*6,000
Desdemona, Eastland	*11,000
Electra, Wilbarger	*6,000
Kermit, Winkler	*18,000
Olden, Eastland	*4,500
Sabine, Gregg	*80,000
Vanderbilt, Jackson	*35,000
Manning, Fred M., McKnight, Throckmorton	†6,000
McCarthy Chemical Co.:	
Stonewall-Jackson Pasture, Jefferson	*105,000
Stonewall-Jackson Pasture, Jefferson	*275,000
Mid-Co Gasoline Co., Cayuga, Henderson	*5,000
Midland Gasoline Co., Conroe, Montgomery	*100,000
Moncrief, W. A., & Sons, Wichita-K.M.A.	*4,000
Nash Gasoline Co.:	
James, Young	*8,000
South Bend, Young	*12,000
Natural Gasoline Corp., Hawkins, Wood	*100,000

TEXAS (Continued)

Company, field or plant, and county—	Approx. prod. (gal. per day)
Natural Gas Pipe Line Co. of America:	
Panhandle, Hutchinson	101,000
Panhandle, Moore	66,000
Nine Oaks Gasoline Co., Gladewater, Gregg	700
Nueces Corp., Agua Dulce, Nueces	†14,000
Odessa Natural Gasoline Co., Foster, Ector	*60,000
Panoma Corp., W. Panhandle, Carson	*100,000
Parade Co., East Texas, Rusk	*225,000
Perkins Co., Burkburnett, Wichita	2,500
Petroleum Reserve Corp., Piedra Pintas, Duval	600
Prewitt, P. H., Joaquin, Shelby	2,000
Phillips Petroleum Co.:	
Bowers, Gray	*26,000
Canadian, Hutchinson	*37,000
Crane, Crane	*55,000
Dumas, Moore	*140,000
Fullerton, Andrews	*140,000
Goldsmith, Ector	*230,000
Gray, Gray	*98,000
Hansford, Hansford	*80,000
Judkins-Harper, Ector	*32,000
K.M.A., Wichita	*40,000
Lefors, Gray	*32,000
North, Gray	*26,000
Pampa, Gray	*46,000
Pantex, Hutchinson	*26,000
Rock Creek, Hutchinson	*145,000
Sanford, Hutchinson	*115,000
Seminole, Gaines	*40,000
Sherman, Hansford	*210,000
Sneed, Moore	*155,000
Pioneer Gasoline Co., Pioneer, Eastland	*5,000
Plymouth Oil Co.:	
Benedum, Upton	*280,000
Plymouth, San Patricio	*90,000
Portland Gasoline Co., Panhandle, Gray	*60,000
Pure Oil Co.:	
Van, Van Zandt	*60,000
Dollarhide, Andrews	*150,000
Roeser & Pendleton:	
Plant 1, Shackelford	5,000
Plant 3, Shackelford	500
Rudco Oil & Gas Co., Rising Star, Brown	*2,250
St. Marys Oil & Gas Co.:	
Colony, Callahan	34,000
Moran, Shackelford	6,000
Shamrock Oil & Gas Corp., Panhandle, Moore	*420,000
Shell Oil Co.:	
Panhandle (1), Carson	5,000
Panhandle (2), Carson	25,000
Panhandle, Gray	15,000
Provident City, Lavaca	*†106,700
T-X-L, Ector	*370,000
Wasson (1), Yoakum	54,000
Wasson (2), Yoakum	*310,000
Sid Richardson Gasoline Co., Keystone, Winkler	*125,000
Sinclair Oil & Gas Co.:	
East White Point (20), San Patricio	*30,000
Gladewater (18), Gregg	*275,000
Troup (19), Rusk-Smith	*100,000
Troup (21), Rusk	*130,000
Skelly Oil Co.:	
West Pampa, Gray	100,000
Burkburnett, Wichita	4,500
Carson, Hutchinson counties (3 plants)	*125,000
Southern Minerals Corp.:	
Saxet, Nueces	*19,000
Stratton, Nueces	*50,000
Standard Oil Co. of Texas, Sivells Bend, Cooke	*42,000
Southern Production Co., Pledger, Brazoria	*18,000
Stanolind Oil & Gas Co.:	
Hastings, Brazoria	*60,000
La Rosa, Refugio	*50,000
Levelland, Hockley	*134,000
Luby, Nueces	*†55,000
North Cowden, Ector	*150,000
Slaughter, Hockley	*250,000
South Fullerton, Andrews	*295,000
Sun Oil Co.:	
Jameson, Coke	*48,000
Sun, Starr	*102,000
Sunray Oil Corp., Snyder, Scurry	*‡547,000
Texas Co., The:	
Chalk Hill, Archer (operator)	*12,350
Electra, Wichita	*23,000
Fuller, Scurry	(‡)
Texas Natural Gasoline Corp.:	
Benedum, Upton	*200,000
Santa Rosa, Pecos	*30,000
Walnut Bend, Cooke	*50,000
Wimberly, Jones	*100,000
Texas Pacific Coal & Oil Co., Caddo, Stephens	*19,000
Texoma Natural Gas Co.:	
Panhandle, Hutchinson	85,000
Panhandle, Moore	44,000
Tide Water Associated Oil Co.:	
Long Lake, Anderson	*40,000
Cayuga, Anderson	*30,000
Sublime, Colorado	21,000
South Stinton, San Patricio	1,300
Yoward, Bee	10,000
United Gas Pipe Line Co.:	
Agua Dulce, Nueces	*49,000
Carthage, Panola	*400,000
Karnes City, Karnes	*50,000
Waggoner, W. T., estate, Waggoner, Wilbarger	7,000
Warren Petroleum Corp.:	
Breckenridge, Stephens	*55,000
Fairbanks, Harris	*25,000
East Texas, Gregg	*190,000
Holliday, Archer	*110,000
McLean, Gray	*50,000
Madden, Wichita	35,000
West Gasoline Co., Cleveland, N. McCoy, Liberty	12,000
West Texas Gasoline Co., W. Panhandle, Potter	25,000
Total	13,863,400

*Includes L.P.G. †Estimated. ‡Under construction.

WEST VIRGINIA

Company, field or plant, and county—	Approx. prod. (gal. per day)
Carnegie Natural Gas Co. (entire holdings), Wetzel Co.	*750
Dinsmoor & Co., St. Mary's, Sugar Creek, Shawnee, Henry Camp, Bills 10-Acre, Fetty, Roby, Brush Run and Pike (2 plants)	200
Falling Rock Channel Coal Co., Falling Rock	3,000
Hope Natural Gas Co.:	
Cornwell, Kanawha	20,000
Hastings, Wetzel	*200,000
Kennedy, Lewis	30,000
Waverly, Wood	20,000
Manufacturers Light & Heat Co.:	
Porters Falls, Wetzel	8,000
Roby's Rock, Marshall	3,000
Owens, Libby-Owens Gas Dept., Kanawha County	12,000
Pure Oil Co., Cabin Creek, Kanawha	*10,000
Quaker State Oil Refining Corp., Wetzel County (2 plants)	8,750
South Penn Natural Gas Co.:	
Bennett, Gilmer	500
Blackshere, Marion	800
Broadwater, Tyler	300
Clay, Clay	2,500
Coldwater, Harrison	300
Copley, Lewis	800
Edgell, Roane	1,200
Fairview, Monogalia	3,000
Griffith, Lincoln	2,000
Hartley-Stephens, Ritchie	2,600
Liverpool, Jackson	500
Lynch, Harrison	3,500
McElroy, Tyler	500
Metz, Marion	1,200
Morgan, Wetzel	3,000
Oil Siding, Kanawha	500
Pine Grove, Wetzel	3,500
Prutny, Ritchie	300
Rock Creek, Roane	1,200
Seckman, Tyler	500
Shinnston, Harrison	500
Stringtown, Tyler	3,000
Sweeney, Tyler	500
Tanner, Gilmer	3,000
Victor, Kanawha	3,000
Wood, Elk Fork, Eddy, Tyler	1,000
United Fuel Gas Co.:	
Cobb plant, Kanawha	40,000
Elk plant, Kanawha	*20,000
Ferrell plant, Kanawha	3,500
Hubbell plant, Lincoln	*40,000
Ona plant, Cabell	18,000
Sandyville plant, Jackson	*30,000
Wheeling Steel Corp., Follansbee, Brooke	500
Total	507,400

*Includes L.P.G.

WYOMING

Company, field or plant, and county—	Approx. prod. (gal. per day)
Continental Oil Co., Lance Creek, Niobrara	*65,000
Northern Utilities Co., Sand Draw, Fremont	3,500
Ohio Oil Co., The:	
Grass Creek, Hot Springs	3,600
Rock River, Albany	*7,500
Pure Oil Co., Worland, Washakie	*40,000
Sinclair Oil & Gas Co., Lost Soldier, Sweetwater	15,000
Stanolind Oil & Gas Co.:	
Salt Creek, Natrona	*93,000
Elk Basin, Park	*56,000
Total	283,600

*Includes L.P.G.

SURVEY OF CYCLING PLANTS

Compiled by The Oil and Gas Journal's Statistical Department

TOTAL liquid production capacity of the 52 operating cycling plants in the United States is up 265,200 gal. daily from The Oil and Gas Journal's Annual Survey Report for 1950. The current capacity of cycling plants plus that of natural-gasoline plants is in excess of 33 million gallons daily.

The number of cycling plants now equipped to produce liquefied petroleum gas is four more than in the previous year. This year's capacity on plants so equipped is nearly 500,000 gal. daily greater than in 1950. Combined current capacity of natural-gasoline and cycling plants equipped for production of L.P.G. is about 28.8 million gallons daily. Compared with last year's figures, current capacities on this type natural-gasoline and cycling plants is up by 14.3 per cent.

This year the ratio of cycling plants equipped to produce L.P.G. to those not so equipped is nearly 3 to 1. Last year this ratio closely approached 4 to 1. Gasoline plants compared on the same basis for last year show a ratio above 2.5 to 1, whereas the ratio on a similar basis for 1951 is slightly below 2.5 to 1.

Texas leads again in plant capacity by nearly 3 to 1 over the next closest state, Louisiana, although there are more than 4.5 times as many plants operating in Texas. Plant-to-capacity ratio for Texas cycling operations is 1 to 125,000 gal. daily, with that for Louisiana running to nearly two times as great.

Capacity ratings on natural-gasoline-plant operations in the United States are given starting on page 193. Capacity and other data on both cycling and natural-gasoline-plant operations are compiled by The Oil and Gas Journal statistical staff from reports obtained directly from the various operating companies.

SUMMARY OF CYCLING PLANTS IN THE UNITED STATES—THEIR DISTRIBUTION AND CAPACITIES

	All plants*		Liquid capacity, plants not producing L.P.G.		Liquid capacity, plants producing L.P.G.	
	No. of plants	Liquid prod. (cap. gal. per day)	No. of plants	Liquid prod. (cap. gal. per day)	No. of plants	Liquid prod. (cap. gal. per day)
Arkansas	1	58,000	0	.....	1	58,000
California	3	764,000	0	.....	3	764,000
Colorado	1	27,000	1	27,000	0	.....
Louisiana	8	1,795,000	0	.....	8	1,795,000
Mississippi	1	190,000	0	.....	1	190,000
Oklahoma	1	57,000	0	.....	1	57,000
Texas	37	4,626,000	13	537,000	24	4,089,000
Total	52	7,517,000	14	564,000	38	6,953,000

*Capacity for natural-gasoline manufacture only plus capacity for natural-gasoline and L.P.G. manufacture.

ARKANSAS

Company, field or plant, and county—	Approx. prod. (gal. per day)
McKamie Gas Cleaning Co., McKamie, Lafayette	*58,000

*Includes L.P.G.

CALIFORNIA

Barnsdall Oil Co., Newhall, Los Angeles	*50,000
Ohio Oil Co. (Operator), South Coles Levee, Kern	*284,000
Western Gulf Oil Co. (Operator), Paloma, Kern	*430,000
Total	764,000

*Includes L.P.G.

COLORADO

Continental Oil Co., McCallum, Jackson	27,000

LOUISIANA

Company, field or plant, and parish—	
California Co., The, Lake St. John, Tensas	*190,000
Cotton Valley Operators Comm., Cotton Valley, Webster	*420,000
Haynesville Operators Comm., Haynesville, Claiborne	*65,000
Southwest-Feazel, Dubach, Lincoln	*100,000
Stanolind Oil & Gas Co., South Jennings, Jefferson Davis	*58,000
Sunray Oil Corp., Benton, Bossier	*210,000
Texas Co., The, Operator, Erath, Vermilion	*672,000
Texas Co., The, Bateman Lake, St. Mary	*80,000
Total	1,795,000

*Includes L.P.G.

MISSISSIPPI

Company, field or plant, and county—	
California Co., The, Cranfield, Adams	*190,000

*Includes L.P.G.

OKLAHOMA

Magnolia Petroleum Co., Chitwood, Grady	*57,000

*Includes L.P.G.

TEXAS

Company, field or plant, and county—	Approx. prod. (gal. per day)
Agua Dulce Co., Agua Dulce, Nueces	*40,000
American Liberty Oil Co., Blessing, Matagorda	*25,000
American Republics, Silsbee, Hardin	*135,000
Anco Gas Corp., Long Lake, Anderson	50,000
Atlantic Refining Co., Crane	*21,000
Big Lake Oil Co., Big Lake, Reagan	80,000
Chicago Corp., The:	
Stratton, Nueces (Gulf Plains)	*150,000
Stratton-Agua Dulce, Nueces (Coastal plant)	*150,000
Stratton-Agua Dulce, Nueces (Wardner plant)	*150,000
Continental Oil Co., McCallum, Jackson	27,000
Distillate Prod. Corp., North Houston, Harris	*51,500
Duval Gasoline Co., Southland, Duval	3,000
Federal O. & G. Industries, Inc., Joyce Richardson, Harris	8,400
Francitas Gas Co., Francitas, Jackson	*35,000
Gasoline Production Corp., Bee	65,000
Geier-Jackson, Inc., Grapeland, Houston	*80,000
Gillring Oil Co., Agua Dulce, Nueces	*40,000
Gray-Wolfe Co., Pinehurst, Montgomery	†20,000
Hamman Expl. Co., Hamman, Matagorda	†20,000
Harrell, H. M., Ehrhardt, Harris	40,000
Humble Oil & Refining Co., Katy, Waller	*870,000
H. L. Hunt, Whelan, Harrison	*25,000
La Gloria Corp., La Gloria, Jim Wells	*300,000
Lone Star Production Co.:	
Grapeland, Houston	*18,000
Opelika, Henderson	*100,000
Carthage, Panola	100,000
Chapel Hill, Smith	*130,000
Magnolia Petroleum Co., Seeligson, Jim Wells	*500,000
Plomo Co., Brayton, Nueces	*65,000
Roeser & Pendleton, Cayuga, Anderson	2,000
Shell Oil Co., Sheridan, Colorado	*282,000
Stanolind Oil & Gas Co., Burnell-North Pettus, Bee	*287,000
Standard Oil Co. of Texas	*73,500
Superior Oil Co., Lake Creek, Montgomery	*462,000
Tide Water Associated-Seaboard, Long Lake, Anderson	*23,000
Trinity Gas Corp., Sejita, Duval	*76,000
Westcol Oil & Gas Co., Nordheim, DeWitt	†25,000
Western Natural Gas Co., San Salvador, Hidalgo	96,500
Total	4,626,000

*Includes L.P.G. †Estimated.

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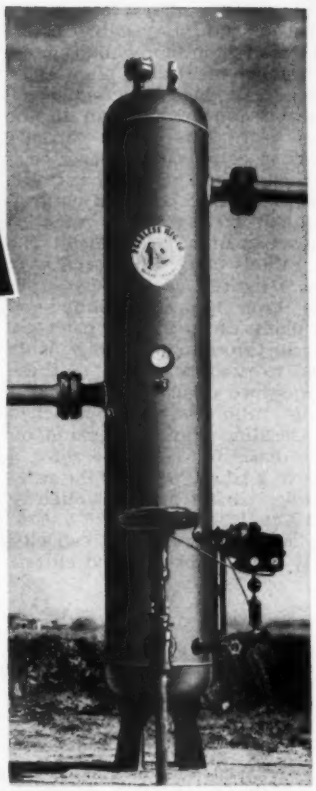
PEERLESS HIGH PRESSURE OIL & GAS SEPARATORS



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— Extra high quality workmanship plus the use of highest quality accessories provide other essential advantages of Peerless High Pressure Oil and Gas Separators.

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Survey of Processing-Plant Projects

Compiled by The Oil and Gas Journal's Statistical Department

REPORTS directly from industry on various projects now building, planned, or under construction for field processing natural gas, show a pronounced upward swing for the first quarter of this year over that of 1950. New plant projects outnumber those for expansion and modernization of existing equipment by a wide margin. New gasoline plants lead the field with new petrochemical installations next. Projects for expansion and modernization of existing natural-gasoline equipment is follow by those involving expansion of various other types of existing natural-gas field processing installations.

Six different natural-gas processing projects are currently in the planning stage. These projects include plants in Colorado, California, Oklahoma, Texas, and Kansas. Combined liquid capacity rating on these plants is upwards of 400,000 gal. daily.

NATURAL-GAS PROCESSING-PLANT BUILDING PROJECTS

Company, location, and type of project—	Capacity rating	Status	Comp. schedule	Contractors
Abercrombie, J. S., Co., Old Ocean field, Texas:				
Dehydration plant, cu. ft. per day	160,000,000	Planned	Late '51	
Atlantic Refining Co., Beauregard Parish, Louisiana:				
Addition compressor and air-cooling facilities	.....	Building	1951	
Arkansas Fuel Oil Co., Carthage, Tex.:				
Increase gasoline plant capacity, cu. ft. per day	50,000,000	Building	Early '51	Arkansas Fuel Oil Co.
Arkansas Fuel Oil Co., Waskom, Tex.:				
Increase plant pressure and add dehydration, cu. ft. per day	60,000,000	Building	Mid '51	Arkansas Fuel Oil Co.
Arkansas Fuel Oil Co., Bistineau, La.:				
Add dehydration facilities, cu. ft. per day	60,000,000	Building	Early '51	Arkansas Fuel Oil Co.
California Co., The, Rangely, Colo.:				
Expansion, gal. per day	65,000	Planned	1951	
Carthage Hydrocol, Inc., Brownsville, Tex.:				
Petrochemical plant	.....	Building	Mid '51	
Commercial Solvents Corp., Sterlington, La.:				
Ammonia plant	.....	Building	.....	
Continental Oil Black Co., Lake Charles, La.:				
Carbon-black plant	.....	Building	.....	
Crosbie, J. E., Inc., Oklahoma:				
Natural-gasoline plant, gal. per day	12,000	Planned	.....	
Dow Chemical Co., Freeport, Tex.:				
Plant enlargement	.....	Building	.....	
E. I. du Pont de Nemours & Co., Victoria, Tex.:				
Petrochemical plant	.....	Building	.....	
El Paso Natural Gas Co., San Juan, N. M.:				
Gasoline plant, gal. per day	54,000	Building	1951	
General Crude Oil Co., Esperson Dome, Texas:				
Pressure-maintenance plant, hp.	330	Building	Early '51	O. L. Olsen Co.
Grimes, Otha H., Carter County, Oklahoma:				
Gasoline plant, cu. ft. per day	4,500,000	Building	Early '51	L. S. Gregory Co.
Gulf Oil Corp., St. Landry Parish, Louisiana:				
Cycling plant, cu. ft. per day	125,000,000	Planned	Jan. '53	
J. M. Huber Corp., Baytown, Tex.:				
Carbon-black plant, lb. per year	30,000,000	Building	.....	Stearns-Roger Mfg. Co.
La Gloria Corp., Jim Wells, Tex.:				
Expand compressor plant	.....	Building	.....	
Dehydration plant	.....	Building	.....	
Lion Oil Co., Scurry County, Texas:				
Gasoline plant, gal. per day	313,500	Building	1951	Hudson Engineering Co.
Lion Oil Co., Magnolia, Ark.:				
Sulfur-recovery unit, tons per day	10	Building	Mid '51	R. A. Graff
Lone Star Gas Co., Bronte, Tex.:				
Desulfurization unit, cu. ft. per day	10,000,000	Building	Early '51	R. A. Graff
Matheson Chemical Co., Houston:				
Fertilizer plant	.....	Building	.....	
Matheson Hydrocarbon Chemical Co., Brandenburg, Ky.:				
Petrochemical plant	.....	Building	Late '51	E. B. Badger & Sons Co.; Stone & Webster Const. Co.
Monsanto Chemical Co., Texas City, Tex.:				
Petrochemical-plant expansion	.....	Building	.....	
Ohio Fuel Gas Co., Medina, Ohio:				
Increase absorber capacity, gal. per day	1,000	Planned	.....	
Ohio Oil Co., Sidney, Neb.:				
Gasoline plant, cu. ft. per day	12,500,000	Building	Early '51	Stearns-Roger Mfg. Co.
Ohio Oil Co., North Markham, Tex.:				
Gasoline-press.-maint. plant, cu. ft. per day	90,000,000	Contracted	Early '52	Hudson Engineering Co.
Pan American Production Co., Willamar field, Texas:				
Pressure-maintenance plant, hp.	8,100	Contracted	Early '51	
Pecos Petroleum Co., Orla, Tex.:				
Enlarge gasoline plant, gal. per day	30,000	Building	.....	
Phillips Chemical Co., Phillips, Tex.:				
Carbon-black plant, tons per year	80,000	Authorized	.....	
Plymouth Oil Co., San Patricio, Tex.:				
Addition of compressor unit	.....	Building	1951	
Pontiac Refining Co. and The Chicago Corp., Corpus Christi, Tex.:				
Petrochemical plant	.....	Authorized	.....	
Portland Gasoline Co., Gray County, Tex.:				
Replacing still and enlarge cooling tower	.....	Building	1951	
Richfield Oil Corp., Kern County, California:				
Gas-injection unit, cu. ft. per day	24,000,000	Building	1951	
Richfield Oil Corp., Santa Barbara County, California:				
Expand gas processing cap., cu. ft. per day	10,000,000	Building	1951	
Expand gas injection cap., cu. ft. per day	8,000,000	Building	1951	

Company, location, and type of project—	Capacity rating	Status	Comp. schedule	Contractors
Shell Oil Co., Elk City, Okla.:				
Cycling plant, cu. ft. per day	100,000,000	Building	Early '51	Refinery Maintenance Co., Inc.
Shell Oil Co. of Canada, Ltd., Jumping Pound, Alta, Canada:				
Gasoline plant, cu. ft. per day	30,000,000	Building	Early '51	The Fluor Corp.
Sid Richardson Gasoline Co., Winkler County, Texas:				
Addition compressor and generating units	.....	Building	1951	.....
L.P.G. underground storage, bbl.	50,000	Building	1951	.....
Sulfur-recovery unit, tons per day	25	Building	1951	.....
Skelly Oil Co., Skellytown, Tex.:				
Revamp. plant, cu. ft. per day	30,000,000	Building	Early '51	J. E. Carlson
Skelly Oil Co., Eunice, N. M.:				
Revise plant, cu. ft. per day	30,000,000	Planned	Early '51	.....
Skelly Oil Co., Velma, Okla.:				
Enlarge plant, cu. ft. per day	57,000,000	Planned	Early '51	.....
Southern Production Co., Brazoria County, Texas:				
Revamp vapor-recovery plant	.....	Proposed	.....	.....
Standard Oil Co. of Calif., operator, Unit Operation, Naval Petroleum Reserve No. 1, Elk Hills, Calif.:				
Enlarge booster compressor unit	.....	Planned	.....	.....
Processing plant, cu. ft. per day	50,000,000	Planned	.....	.....
Stanolind Oil & Gas Co., Nueces, Tex.:				
Expand gas capacity, cu. ft. per day	37,000,000	.....	1951	.....
Expand liquid capacity, gal. per day	55,000	.....	1951	.....
Stanolind Oil & Gas Co., Grant, Kans.:				
Expand gas capacity, cu. ft. per day	325,000,000	.....	1951	.....
Expand liquid capacity, gal. per day	283,000	.....	1951	.....
Sun Oil Co., Richland Parish, Louisiana:				
Additional recovery and separation facilities	.....	Planned	.....	.....
Sunray Oil Corp., Snyder, Tex.:				
Gasoline plant gas processing, cu. ft. per day	70,000,000	Building	Mid '51	Fluor Corp.
Superior Oil Co., Colorado County, Texas:				
Gasoline plant, cu. ft. per day	60,000,000	Building	Mid '51	Brown & Root Const. Co.
Taylor Refining Co. and Mayfair Minerals, Inc., McAllen, Tex.:				
Cycling-plant expansion, cu. ft. per day	70,000,000	Building	Late '51	Gasoline Plant Const. Co.
Tennessee Gas Transmission Co., Greensburg, Ky.:				
Gasoline plant, cu. ft. per day	600,000,000	Building	Mid '51	.....
Texas Co., The, Scurry County, Texas:				
Gasoline plant, cu. ft. per day	15,000,000	Building	Late '51	.....
Universal Petroleum Co., Beaumont, Tex.:				
Gas booster plant, cu. ft. per day	5,000,000	Building	Early '51	.....
Warren Petroleum Co. et al, Major County, Oklahoma:				
Gasoline plant, cu. ft. per day	50,000,000	Contracted	1951	Gasoline Plant Const. Co.
Western Natural Gas Co., Live Oak County, Texas:				
Separation plants, cu. ft. per day	30,000,000	Building	Early '51	.....

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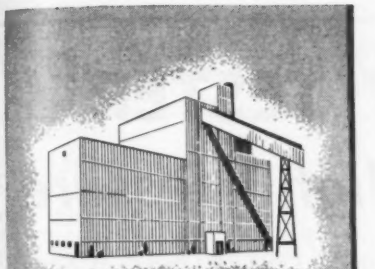

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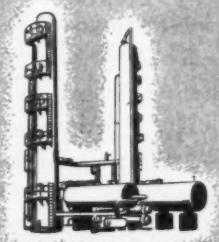

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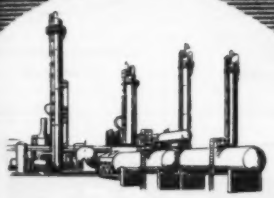

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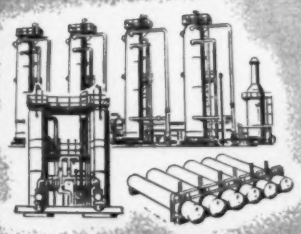

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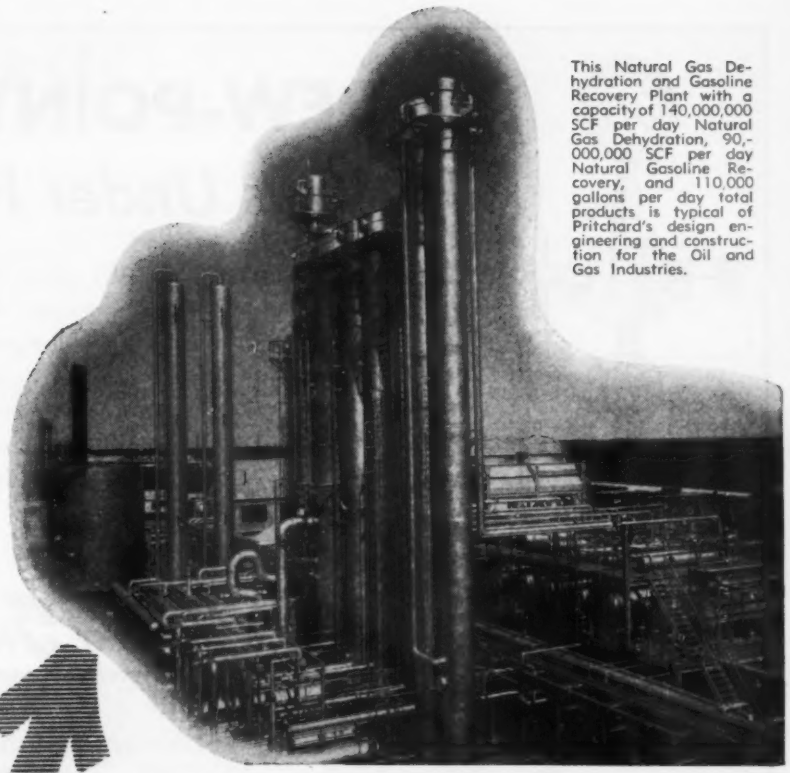

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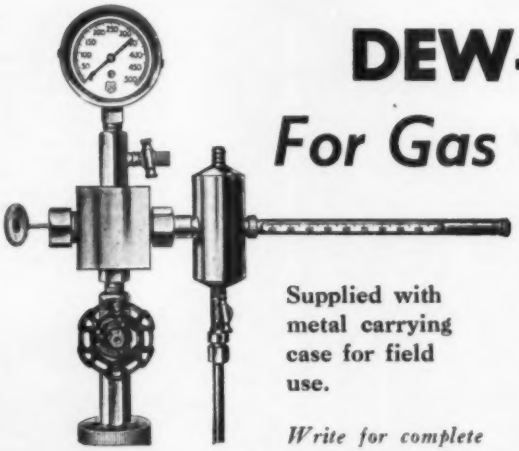

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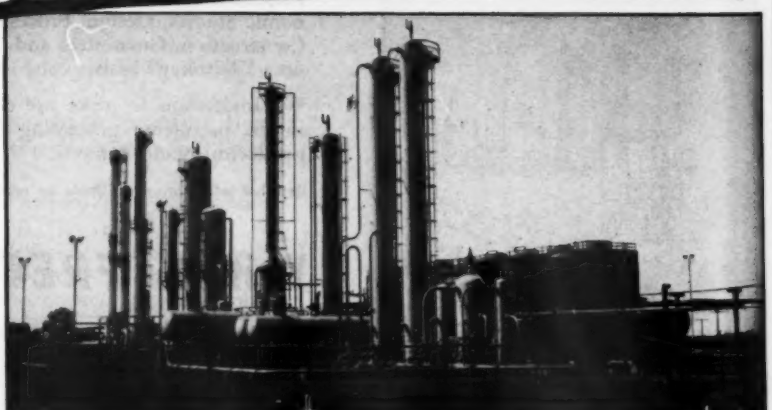

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N.G.A.A. Digests

ABSTRACTS of some of the papers presented at the N.G.A.A. sponsored Low-Temperature Fractional-Analysis Seminar at Fort Worth, March 15-16, are given here. The seminar was held in connection with the N.G.A.A.'s hydrocarbon fractional-analysis program within the industry.

Obtaining and Transferring Representative Samples of Natural-Gas Fluids

W. D. ASHER, Atlantic Refining Co., Dallas.

OUTLINE of equipment setup and procedures in handling liquid and gas samples from field and plant and transfer of such samples to analytical equipment without loss or contamination. Proper sampling equipment discussed with respect to handling of field samples, including stabilized liquids, liquids under pressure, separator gas, and bottom-hole samples. Fig. 1 shows a method used for taking samples of separator gas and liquid.

Fig. 2 illustrates how laboratory samples may be transferred from a phase cell used in pressure-volume-temperature phase studies of reservoir fluids. Sample is transferred at constant pressure by withdrawing mercury from sample container while simultaneously injecting mercury into the phase cell.

Arrangement of equipment which permits a representative sample to be dedivered to the stillpot of a distillation column is shown in Fig. 3.

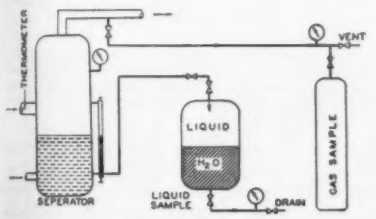

Fig. 1—Sampling of liquid and gas from field separator.

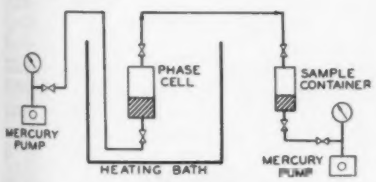

Fig. 2—Arrangement for transfer of laboratory sample from phase cell.

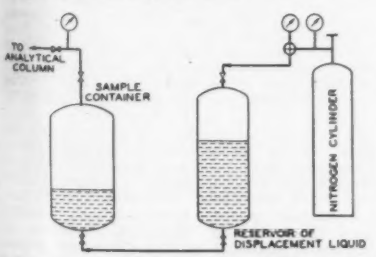

Fig. 3—Transfer of liquid samples under pressure.

Low-Temperature Fractional Analysis of Liquids and Gases

W. J. PODBIELNIAK, Podbielniak, Inc., Chicago.

PRECISION low-temperature fractional analysis is inherently capable of accuracies within 0.1 to 0.2 per cent. By proper training of analysts and development of specific analytical procedures where applicable, these accuracies may be approached and reductions in total distillation time may be obtained. Errors in operating technique include: (1) those due to the human element; (2) errors in equipment such as leaks, obstructions, and contamination; (3) sample absorption in rubber tubing; (4) improper calibration of apparatus; and (5) improper thermocouple location. Regarding apparatus with automatic control and recording devices, particular attention must be paid to proper adjustment of the controls, maintenance of electrical contacts, and condition of control valves.

Auxiliary Techniques in Low-Temperature Fractional Analysis

D. E. SMITH, Phillips Petroleum Co., Bartlesville, Okla.

ACCURACY of low-temperature fractional analysis may be improved by two auxiliary techniques. These are: (1) The vapor-pressure method for the analysis of transition fractions, and (2) the refrac-

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tionation method for determining cut points. The vapor-pressure method consists of measuring the vapor pressure of the fractions distilling between plateaus and reading the composition of the fractions from calibration curves. The method offers considerable improvement in accuracy over conventional procedures because it eliminates holdup errors. A smaller sample may be taken for analysis thus decreasing the time required for analysis. The refractionation method involves refractionation of the fractions distilling between plateaus in a column of smaller diameter and holdup. The sharpness of the cut points is considerably improved and the errors due to holdup are decreased. Of the two methods the vapor-pressure method is more accurate and less time consuming. However, the refractionation procedure is more reliable in the hands of inexperienced operators.

Calculation of Correction for Column Holdup

C. J. SMITH, Western Gulf Oil Co., Bakersfield, Calif.

VAPOR holdup between the temperature and pressure-measuring sections of the Hyd-Robot apparatus was investigated. Known mixtures of propane, isobutane, and normal butane with variation in the propane contamination of from 0.25 mol per cent to 7.00 mol per cent were used to check analysis error which has been found to occur when the lowest boiling constituent of a mixture is present in small amounts. From the results obtained it was concluded that (1) the low result on the first fraction was due to out-of-phase error in the distillation equipment, (2) a correction could be applied to the chart travel of the first fraction to improve the distillation accuracy, and (3) the measurement of propane contamination of less than 0.5 mol per cent is questionable. From a tabulation of the propane content of some of the analyses showing the true composition mol per cent, the analysis mol per cent and the corrected mol per cent by the addition of 3-mm. chart travel, it was concluded that application of a correction for vapor holdup will give an approach to the true composition. Liquid holdup is also recognized as a serious cause of error, probably in some cases greater than that of vapor holdup. However, it is variable and for that reason it would be difficult to make a correction.

In addition to the papers abstracted above, other papers presented at the N.G.A.A. seminar were: "Correction of Operating Difficulties Due to Column Holdup," J. C. Allen, The Texas Co., Bellaire, Tex.; "Equipment Calibration, Design, and Evaluation," M. F. Wirges, Cities Service Oil Co., Bartlesville, Okla.; "Combustion and Orsat Analysis," F. R. Brooks, Shell Development Co., Emeryville, Calif.; and "Personnel," J. L. Thompson, Lone Star Producing Co., Dallas, Tex.

BOOKS

THE FINANCIAL POST SURVEY OF OILS. Published by Maclean-Hunter Publishing Co., Ltd., 481 University Avenue, Toronto. 256 pp. $2.

This survey chronicles data on more than 500 companies engaged in western oil production and exploration. Besides its individual articles on companies, including data on production, earnings, dividends, property interests, and management, it provides an enlarged section of maps covering leading Canadian fields including Redwater, Leduc-Woodbend, Golden Spike, Stettler, Atchesson, Flint, Excelsior, Campbell, Lloydminster, as well as lease maps of both Alberta and Saskatchewan. There is a wealth of statistical material on the Canadian petroleum industry. A section listing inactive and defunct companies brings to over 2,500 the total of companies covered.

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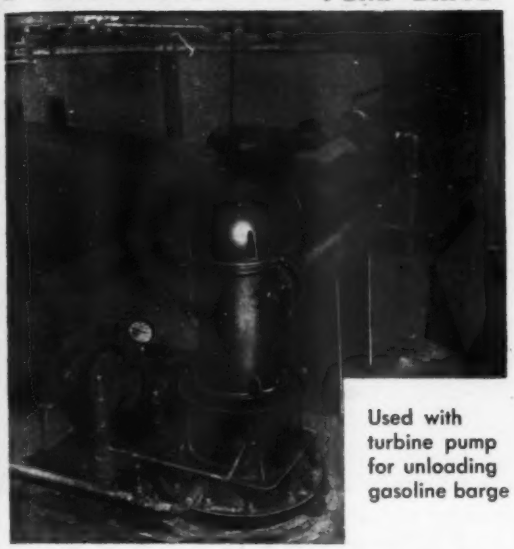

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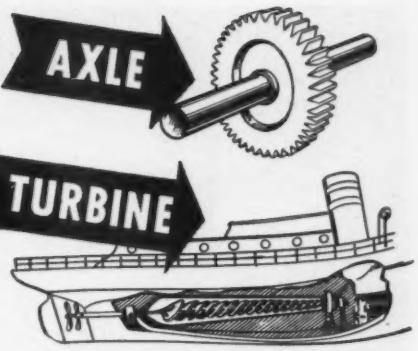

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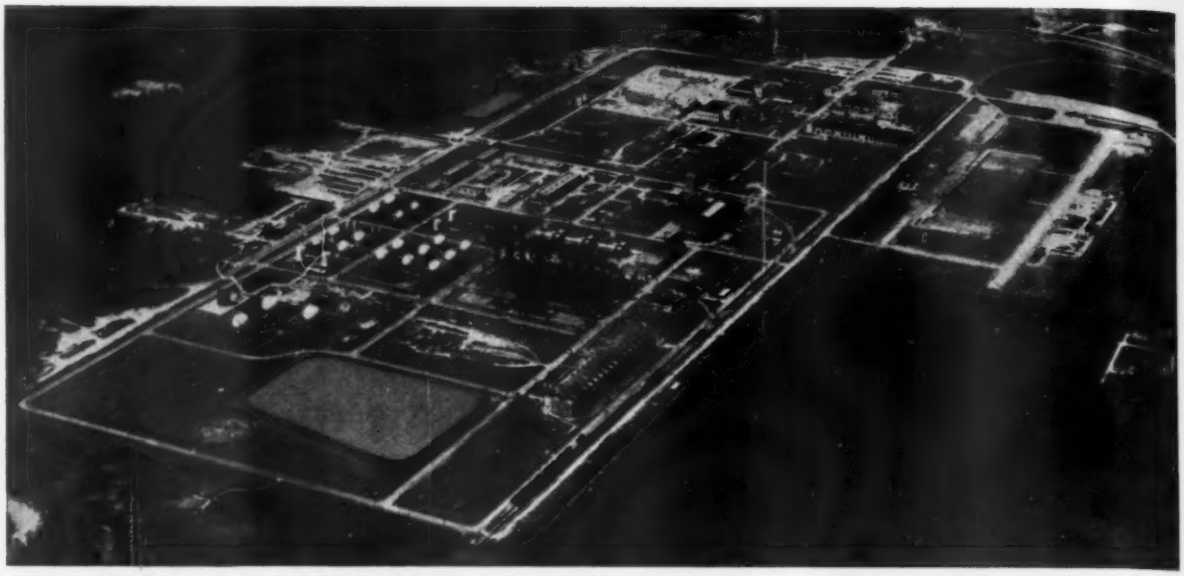
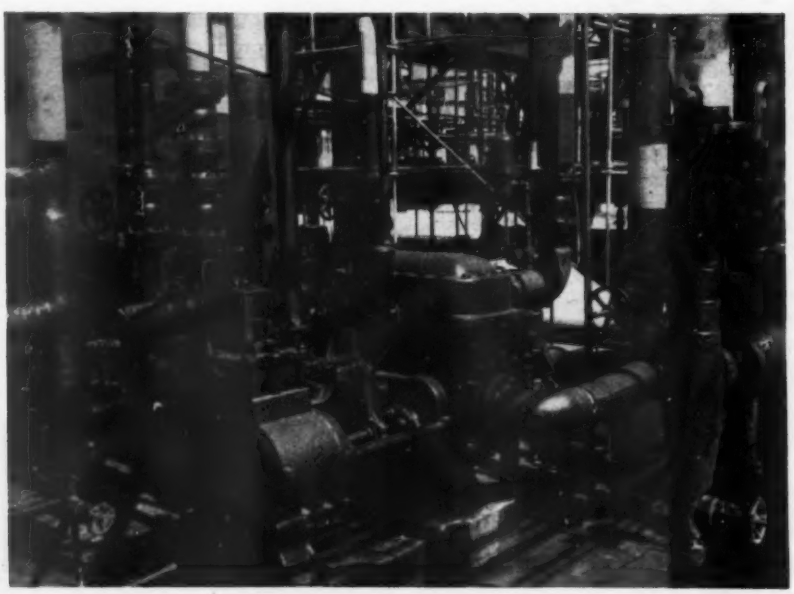


Aerial view of Sinclair Rubber, Inc., butadiene plant at Houston.

Butadiene Plant Reactivation Completed 90 Days After Work Started

Considerable repair and replacement work was necessary in addition to inspecting, servicing and testing each piece of equipment and training new employes. This report, prepared by Sinclair engineers, tells how the record reactivation program was carried out.



This view of outside piping and one of the pumps shows the general condition of equipment before beginning reactivation operations.

THE government-owned butadiene plant operated by Sinclair Rubber, Inc., at Houston, was ordered shut down and placed in standby service on August 20, 1947. Orders for its reactivation were issued by the Office of Rubber Reserve on July 11, 1950.

Immediately after reactivation orders were received, mechanical forces were employed under contract with construction and maintenance companies to perform the reactivation work. Supervisory personnel during previous operation were reemployed by Sinclair Rubber, Inc., within a few weeks and a program was organized on the basis of reactivating the plant within 90 days. Work progressed as scheduled and even though reactivation was not entirely completed, the feed-preparation unit was ready for operation on October 1, 1950. The first feedstock was received on October 23 and the initial unit was charged the same day. Just 15 days later, the plant was producing specification butadiene.

No great difficulty was anticipated for the reactivation operations since periodic inspections during the standby period disclosed most of the plant equipment to be in good condition. However, there was a considerable amount of repair and replacement work to be done during the 90-day period in addition to inspecting, servicing, and testing each piece

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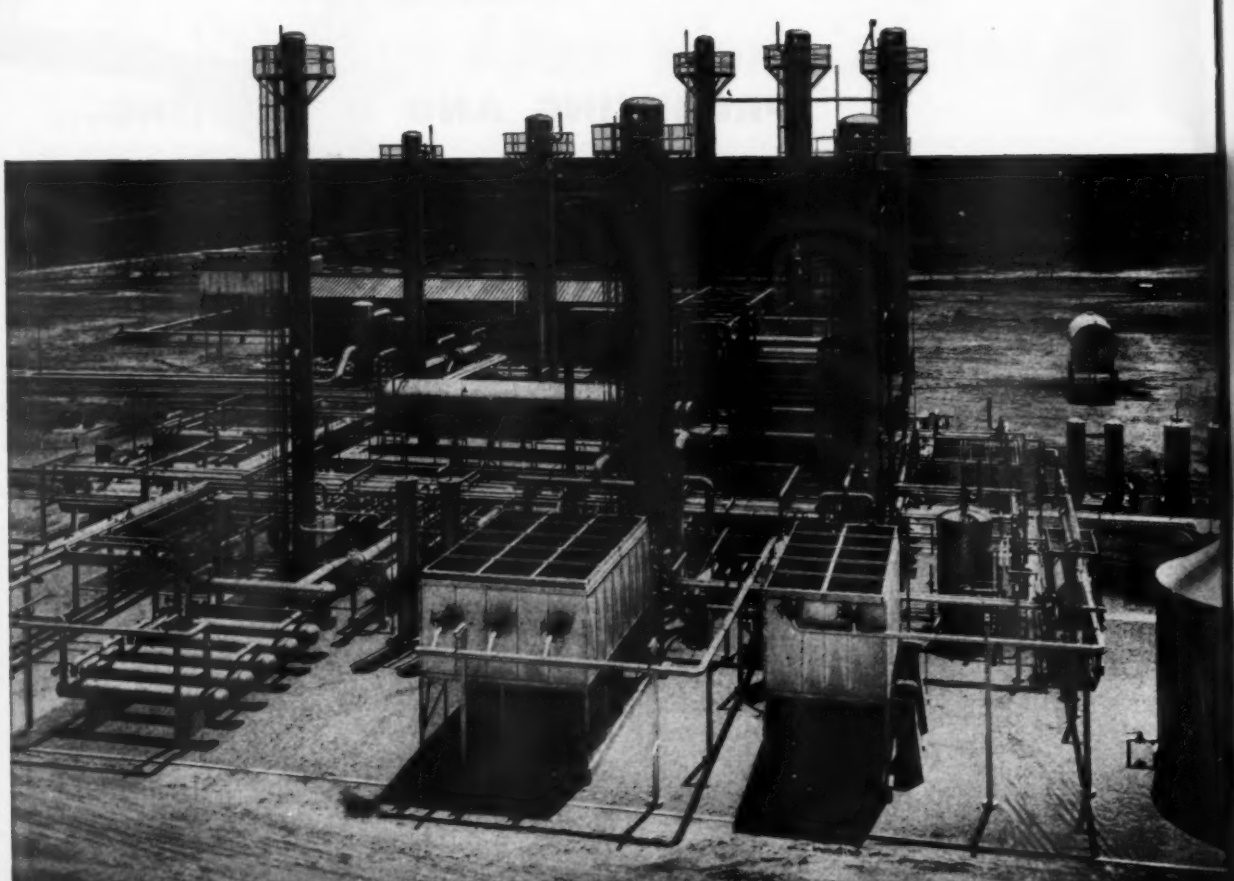

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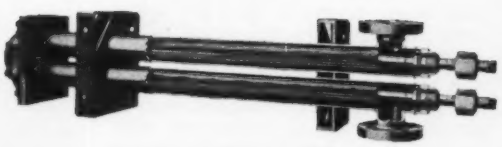

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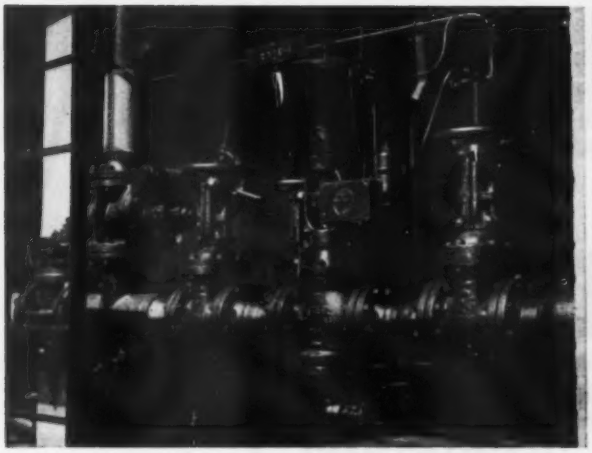


View of a flow-control-valve installation at time of starting reactivation. Valves and piping were protected with Rust-O-Lene D.

During standby period this turbine was protected with Rust-O-Lene B and C. In this view the turbine is shown partially dismantled.

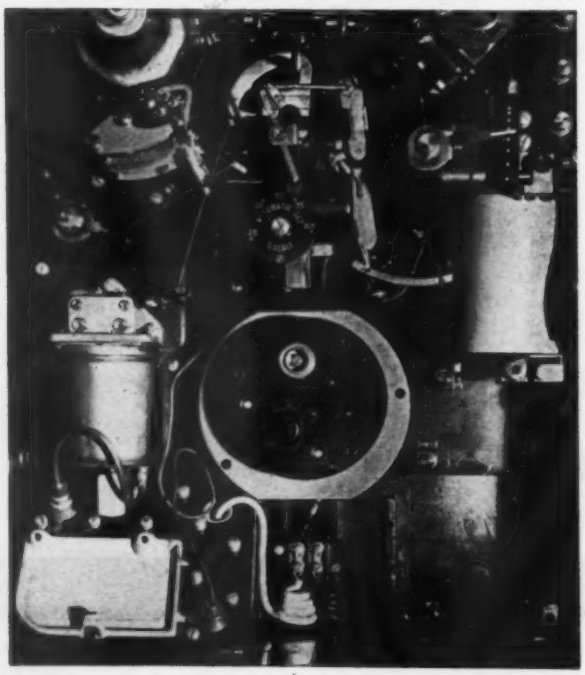
of equipment for operation. Consequently, a rigid schedule of inspection and work progress was set up in order to complete the work in the most expeditious manner.

A great amount of reactivation work consisted of replacing wooden structures, such as walkways, platforms, stairs, and handrails around process equipment and the cooling tower. These facilities had deteriorated to the extent that preparations were under way to proceed with replacement when reactivation orders were issued. Another major item included reinsulation of equipment like waste-heat boilers, steam drums, heaters, reboilers, lines, and some towers. The original insulation on a large portion of the equipment became water-soaked after the plant was shut down and had to be removed during standby so that the metal surfaces could be protected from excessive rusting. A tower reinsulation program was in progress when reactivation orders were issued.

Valves, springs, and end cover from a steam-powered reciprocating pump. All of these parts are in excellent condition due to protective coatings applied prior to placing the plant in standby service.

Mechanical equipment, in general,

Interior of a controller which had been sprayed with Rust-O-Lene G. Condition of this instrument is typical of all of those in the plant.



During the standby period this instrument, a flow transmitter, was protected with a sprayed coating. Photographed during reactivation.

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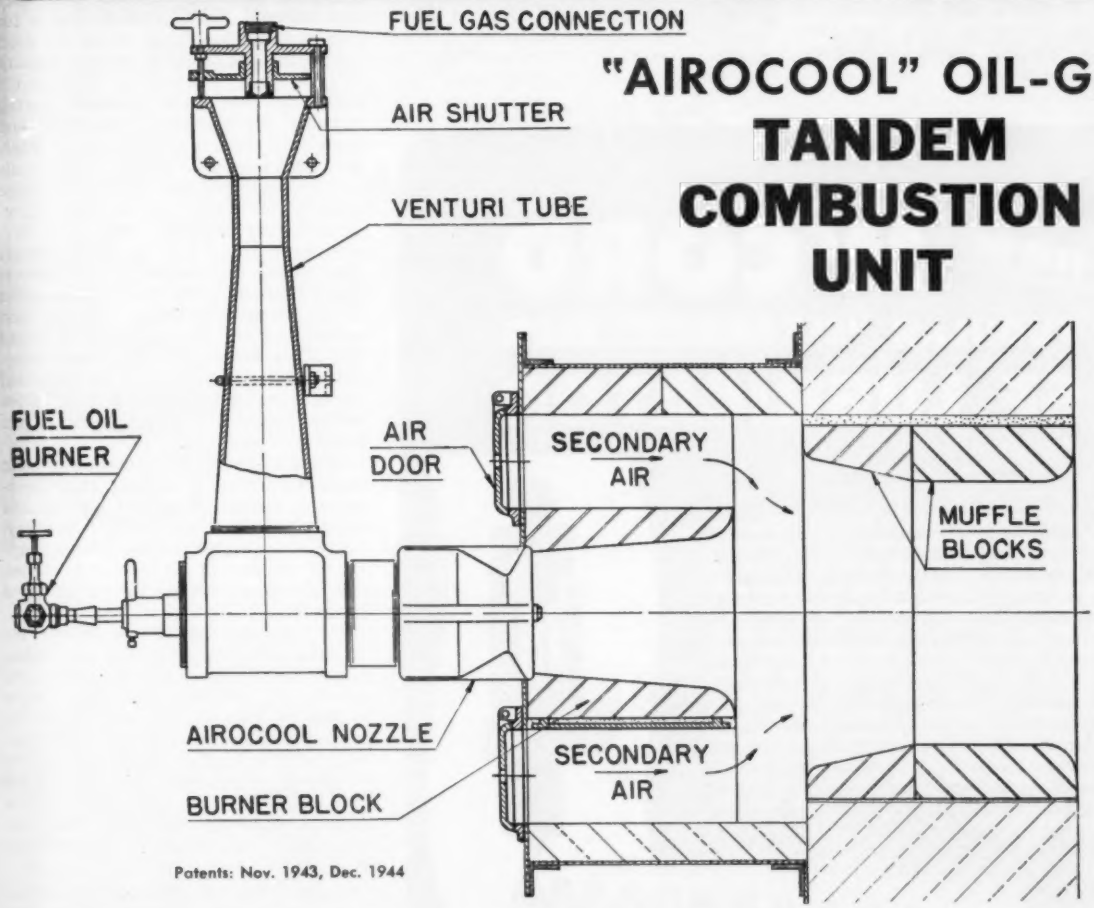

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It is this formation of flame, exactly suited to the furnace, that at once distinguishes the heater equipped with Tandem Combustion Units as a heater which has more barrels throughput per day, more days per run, and more products per fuel dollar. We will be glad to comply with your request for further information on the Tandem Combustion Unit and the various types available.

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was found in good condition and very little repair work was required to place it in service. Only a minimum amount of replacement of parts was necessary. All machinery, such as pumps, turbines, and gas compressors were disassembled, cleaned, and inspected. The good condition of the equipment may be attributed to the protection afforded by rust preventives* used in placing the equipment in standby. No failures were found where the rust preventives had been applied. The principal categories of equipment protected with rust preventives included pumps, turbines, gas compressors, heaters, heat exchangers, valves, piping, and instruments. Equipment such as heat exchangers and interior of accumulators protected with grease-like products only required steaming and testing before placing in service.

*Sinclair Rust-O-Lene.

The remarkable condition of the instruments which had been protected with rust-preventive oil and stored inside temperature-controlled buildings during standby was an important factor in reactivating the plant in minimum time. Since a large quantity of highly sensitive instruments is required in the operation of the butadiene plant, there was considerable reactivation work involved in calibrating, aligning, resetting, synchronizing and reinstalling the instruments even though little repair work was required.

The pictures included show typical condition of instruments, pump parts, turbine parts, and valve and piping installations when reactivation was started.

Only the bottom inspection plate was opened on towers that had been placed in standby in order to inspect the internal floats and to check for rust scale. The floats were in good condition and only a minor amount of rust scale was found. The towers that had not been cleaned during standby were opened, cleaned, and necessary repairs made to their internals. While considerable rust scale was found in the most of these towers, the actual loss in shell thickness during standby was very low, averaging about 0.10 in. on the towers that were so checked. All towers were washed down, hydrostatic tested at 1½ times operating pressure and steamed. Very few leaks were found and the condition of the tower internals showed to be good as indicated by no unusual operating difficulties being encountered in placing the plant in operation.

Reactivation of electrical equipment required complete testing and checking the condition of all wiring and equipment that had been in standby. Megger insulation tests were made on all motors of 60 hp. and higher, and all were found to be in good condition.

The thermocouple circuits in the process area were tested for continuity and condition of insulation. Repairs to wiring or conduit were found necessary on approximately 35 per cent of the circuits. Asbestos-covered wires on a number of circuits on reactor thermocouples were dried by circulating 5½ amp. of 60-cycle current through the No. 16 iron-constantan pair while compressed air was used to ventilate the conduits.

Explosionproof mercury switches and circuits on all liquid-level controllers were tested and only one switch assembly required replacement. More than 90 per cent of the lighting and power circuits were found to be in usable order but the thin-wall conduit and insulation on the wire were found in bad condition. A considerable number of lighting fixtures, explosionproof, and vapor-tight fixtures had to be replaced.

Reactivation of the 120,000-g.p.m., 32-cell cooling tower required replacement of all the original laminated plastic fan blades. These blades had lost contour and were badly cracked. The fan turbines and reduction gear cases were serviced for operation by draining the rust-preventive oil, cleaning and inspecting all parts, and reinstalling the carbon segmental packing rings and springs that were removed when placing the turbines in standby. Since the cooling-tower

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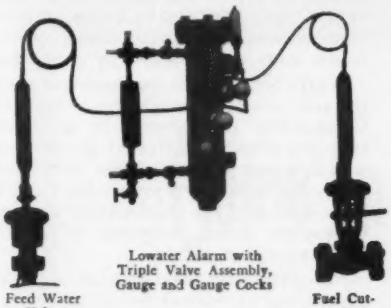

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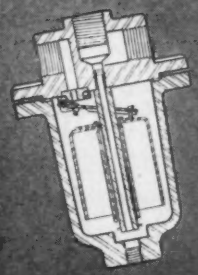

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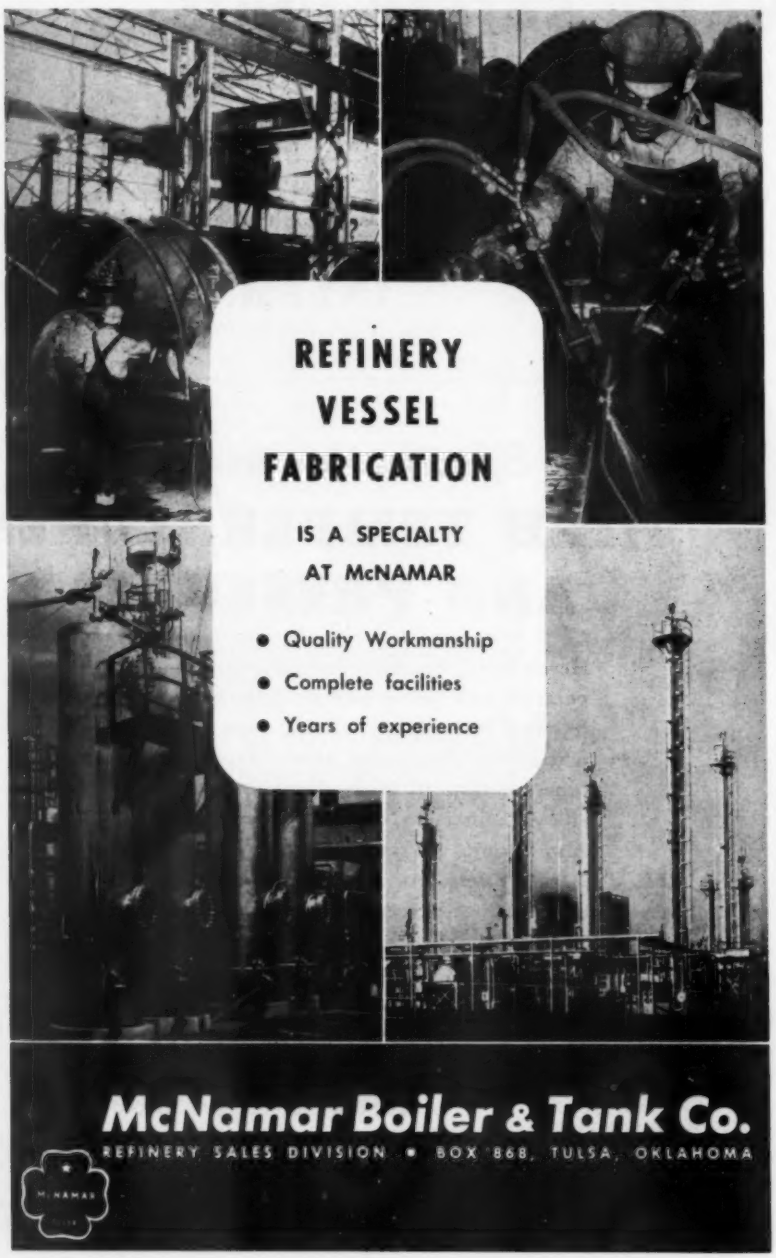
water pumps had been in periodic service for keeping the tower wet, reactivation of this equipment was not required. Some repair was necessary on the cooling-tower structure, but warpage was not serious since the tower had been kept wet.

While the majority of plant equipment and facilities was in good condition, there were certain items found in poor condition and required repair or replacement. Electrolytic corrosion to underground piping presented the greatest amount of deterioration of equipment. Piping underneath all road crossings and gantry tracks had to be uncovered and repaired or replaced. Other equipment found in poor condition which included the bottoms of two acid tanks, acid heater tubes, expansion joints, and waste-heat boiler tubes, were all damaged by corrosion.

While some of the equipment found in poor condition might be attributed to standby procedures, it is questionable whether different procedures would have prevented the corrosion or would have been justifiable on the basis of cost. This particularly applies to heater tubes, bottoms of tanks, and expansion joints.

No difficulty was encountered in employing personnel for plant operations but a problem was involved in processing and training new employes within a 90-day period. An extensive training program was set up for all new operators and 1 week of the program included observation of operations in a similar butadiene plant. About 50 per cent of the 400 employes required for operation are former employes who operated the plant during World War II.

The short time required to reactivate the plant, as well as the production of butadiene just 15 days after the introduction of feedstock, can be attributed to the efficiency of standby, protection and maintenance, and a coordinated schedule of reactivation. When operating at proven capacity, production of butadiene will be approximately 75,000 tons annually.



Richfield's Cuyama Valley L.P.G. Loading Racks

(Continued from page 153)

mitter No. 2 is connected to the setting mechanism of controller A. The check valve in the line permits the set pressure to be increased as the pressure downstream from motor valve No. 4 increases but does not permit the set pressure to be decreased. A drop in pressure below the set pressure thus causes the controller to close motor valve No. 4.

If the loader anticipates a drop in pressure such as occurs when one or more pumps are stopped near the end of the loading operation, he may prevent a shutdown from occurring by momentarily opening the normally closed, spring return valve which bypasses the check valve. This permits the set pressure to be reduced simultaneously with a drop in line pressure.

The lower pressure limit stop of controller A is set for a pressure a few pounds higher than atmospheric to insure that motor valve No. 4 will be closed when the hoses are not connected to a truck. Motor valve No. 4 can be opened to build up the downstream pressure to a pressure greater than that for which the lower limit stop is set by pressing the loading push button. This bypasses air around the controller directly to the diaphragm of motor valve No. 4. It is held so long as the loading push button is held in the closed position. As soon as the pressure on the push button is released, control of the motor valve is returned to controller A.

It was also desired to insure that motor valve No. 4 would close instantly if the pumps were stopped, and that it could not be opened again until the pumps were started. This was accomplished by installing solenoid-operated, three-way valves in the instrument air lines supplying controller A and transmitter No. 2.

When the solenoids are deenergized the three-way valves shut off the air supply to the controller and transmitter. To insure that the solenoids can be energized only when the

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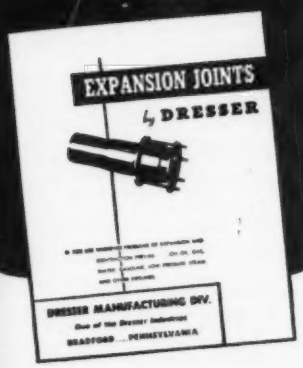

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Operator's Procedure for Loading L.P.G. Into Tank Trucks

1. Determine the pressure in L.P.G. storage tanks.
2. Block truck wheels and connect static grounding cables to truck.
3. Close vapor stack valves at loading rack.
4. Connect vapor hoses to truck and slowly open truck vapor valves.
5. Determine (a) pressure in the truck, and (b) kind of vapors in the truck.
6. Decide what is to be done with truck vapors and loading vapors, i.e., (a) whether truck vapors are to be stacked, (b) whether truck vapors and loading vapors are to be sent to plant vapors, or (c) whether truck vapors and loading vapors are to be commingled with storage tank vapors.
7. If truck vapors are to be stacked (in accordance with 6a above) with vapor return valves at loading rack closed, open vapor stack valves at loading rack. After truck vapors have been stacked, close vapor stack valves at loading rack.
8. Connect L.P.G. loading hoses to truck, and inject odorant into loading lines.
9. Slowly open truck-loading valves and loading-rack vapor-return valves.
10. Open unloading valves on storage tanks and open suction and discharge valves on pumps.
11. If truck vapors and loading vapors are to be sent to plant vapors (in accordance with 6b above), see Note 1 on Fig. 4.
12. If truck vapors and loading vapors are to be commingled with storage tank vapors (in accordance with 6c above), see Note 2 on Fig. 4.
13. Start pumps with electric start-stop switches.
14. Open L.P.G. loading valves at loading rack.
15. Push down on loading push button, and hold down on button until the safety shutoff valve (motor valve No. 4) begins to open, and until the pressure as indicated by the L.P.G. pressure gage has reached a prescribed amount. Then release the push button.
16. When trucks are loaded, shut down loading pumps by pushing pump stop buttons at loading racks. When it is desired to reduce the number of loading pumps being used while still continuing to load L.P.G., the following procedure shall be used.
a. Manually open the knob-operated spring return valve, and hold it open.
b. Shut down loading pump(s) by pushing stop button(s).
c. When the indicating pointer of the output pressure gage of transmitter No. 2 has come to a rest position, manually close the knob operated spring return valve.
17. Close truck-loading and vapor valves.
18. Close the loading and vapor lines at the loading rack.
19. Vent the loading and vapor lines through the stack line by opening the L.P.G. stack valves and vapor stack valves, and leave these stack valves open.
20. Disconnect the loading and vapor hoses from the truck, and connect the hoses to the connections on the loading rack.
21. Disconnect ground cable and unblock truck wheels.
22. Close suction and discharge valves on pumps.
23. Close unloading valves at storage tanks.

Addenda:

A. The operator will be permitted to load from either one or two hoses with one, two, or three loading pumps being used.

B. During loading, the operator shall keep a check on the L.P.G. and vapors pressure gages at the loading rack. Pressures in excess of normal may indicate closed internal truck valves. The operator shall insure that the internal truck valves are open during loading.

C. Under normal conditions when there is no evidence of the presence of flammable or explosive vapors, the following operations will be permitted:

1. Another truck pulling on to the adjoining loading pad, while one truck is being loaded.
2. Performing steps (1) through (8) on another truck, while one truck is being loaded.
3. One truck starting up and pulling away from loading pad, while another truck is being loaded.

D. If at any time during loading it is desirable to stack the truck vapors, close the loading-rack vapor-return valves and open the loading-rack vapor stack valves.

E. If for any reason the loading push button will not return to the open position upon release of pressure on the button, the operator shall trip the safety switch to the "off" position. This will shut off the instrument air to the loading rack controls and shut down all loading pumps. The operator shall also trip the safety switch to the "off" position if for any reason any or all of the pump stop switches at the loading rack do not function.

pumps are running they are supplied with current from the secondaries of transformers, the primaries of which are connected across one phase of the cables supplying current to the pump motors. This detail is also shown on Fig. 2.

To eliminate the difficulty previously experienced when truck vapors were taken to the plant intake rather than returned to the storage tanks, a separate regulator was provided to control the pressure on the tank truck for this type of operation. This consists of motor valve No. 3 and pressure controller B of Fig. 2. Pressure controller B is of the auto-

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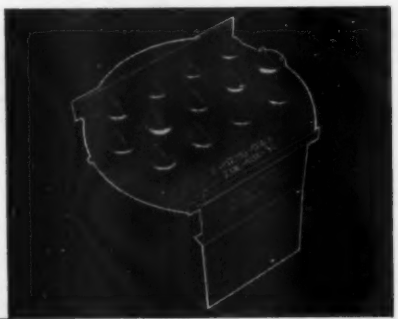

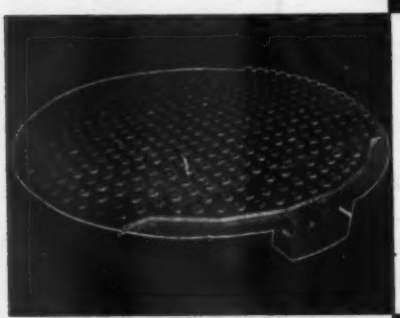

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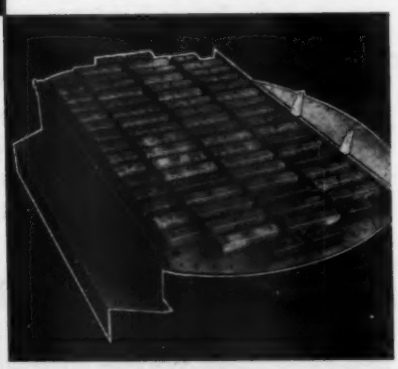

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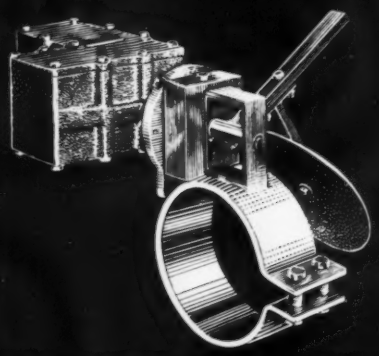
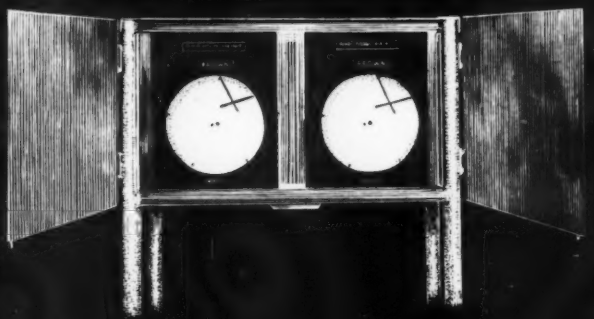
The S&J Mud Pit Level Gauge. Located in the mud pit this sturdy, non-tippable, tubular steel frame supports the transmitting mechanism and heavy duty steel float which is partially counterbalanced.



The S&J Mud Flow Indicator. Mounted over the end of the mud return outflow pipe, the counterbalanced gate measures and transmits changes in the mud flow rate.

The S&J Visual Indicator and Alarm. Mounted on the drilling floor at easy-to-read eye level, it shows at a glance the mud pit level and rate of mud return.



The S&J Mud Flow and Mud Level Recorder. Located away from the rig, free of vibration, this instrument keeps a permanent record of all changes in mud pit level and rate of mud return flow. Driller or relieving crew can refer to these records and note any trend which might indicate the possibility of a well blowout.

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matic-set type. It is kept automatically set for the pressure existing in the storage tanks by transmitter No. 1.

Fig. 3 shows the facilities which are provided at each truck-loading spot for injecting odorant into the liquid stream. The odorant is stored in a pressured tank, not indicated on the diagram.

Fig. 4 shows a simplified diagram of the storage and loading facilities. It is believed that the method of operating the facilities will become apparent from a study of the diagram. Loading instructions which refer to Fig. 4 have been prepared covering all phases of operation.

In addition to the facilities described a shelter has been provided for the comfort and convenience of the truck drivers. This shelter contains a toilet, wash basin, and bench. The shelter is heated during the winter months.

Highest-Pressure Gas-Injection Program

(Continued from page 157)

near operating temperature by continually bleeding a small quantity of steam through the unit. Traps just ahead of the turbines remove entrained water.

Steam for plant use is furnished by two 150-hp. 350-psi. boilers. Normal operating pressures are on the order of 180 psi. Both of these boilers are lit off at all times.

After a power failure, when turbines are driving the auxiliaries, it is necessary to manually reset and start the electric-motor drivers, and to manually shut down the turbine-driven equipment.

Other automatic features of the plant include a device that will ground out the magnetos on the compressor engines in the event of an extraordinarily high liquid level in the low-pressure separation system. An automatic shutoff is also provided in the event of an abnormally low gas-supply pressure, to prevent air from getting into the gas-supply system.

Water Supplies

All boiler feed water is treated with a zeolite softener, and with the addition of chemicals into the boiler itself. Water is supplied from a 10,000-bbl. tank outside the plant grounds, which in turn supplies a smaller 1,000-bbl. tank at the boiler site. Water is taken from a pressured field-wide supply system.

Engine jacket water is made up of condensate from the several plant turbine warmup lines. This cooling-water system is closed and any make up needed is taken from the condensate system.

The plant fire-protection system includes a high-pressure water supply that is provided with both steam and electric-driven pumps. This system uses both spray and jet water nozzles which are supplemented by steam lances and powder and foam-type extinguishers.

The plant described is furnishing gas to what might be termed a partial pressure - maintenance program — a kind of pilot operation. Plans are in the making for expanding the plant to one of much larger size. Block 31 field consists of 72 wells that produce a very high-gravity crude from either or both of two formations. The gas produced is sour, necessitating the dehydration and sweetening equipmen described above.

As a result of the drying of the injected gas very little trouble has been encountered as a result of corrosion, even though the hydrogen sulfide is not treated out of the gas except for fuel purposes.

Block 31 plant was built by Hudson Engineering Corp., Houston.

Gulf Oil's Plant

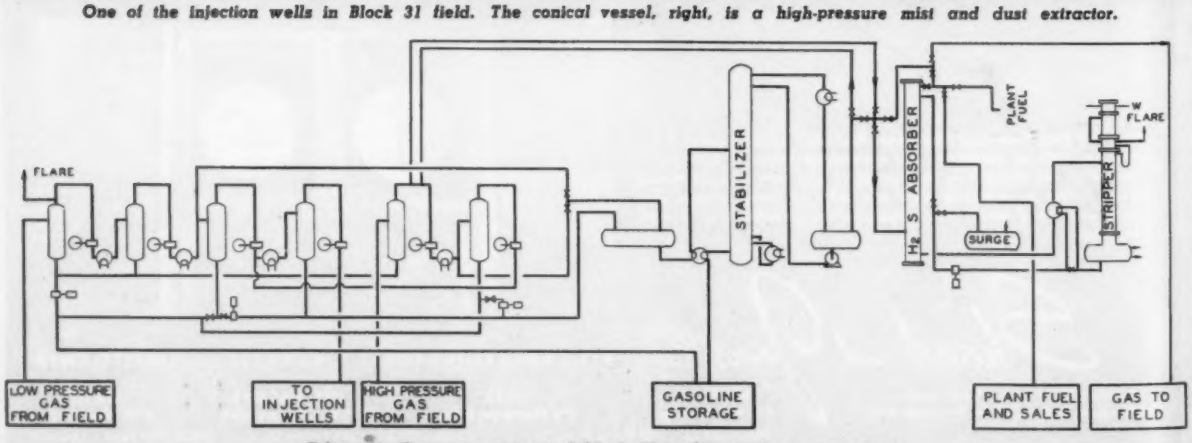
(Continued from page 150)

deethanizer, and debutanizer and a unit for sweetening the gasoline product. Water for process and final gas cooling is cooled by a six-cell induced-draft cooling tower handling 10,000 g.p.m.

Finished products storage consists of eight 1,000-bbl. propane tanks, six 1,000-bbl. butane tanks, and six 1,000-bbl. gasoline tanks. The railroad loading rack has facilities for 20 tank cars and each spot can handle gasoline, butane, propane, and mixtures. The truck-loading rack has two islands and can handle four trucks simultaneously.

The gas-drying unit consists of three automatically controlled solid-desiccant filled vessels. While one vessel is in service, the second is being heated to cause regeneration and the third is being cooled for return

One of the injection wells in Block 31 field. The conical vessel, right, is a high-pressure mist and dust extractor.



Schematic flow arrangement of Block 31 pressure-maintenance plant.

to service. In service, it has been found that traces of hydrogen sulfide are adsorbed by the desiccant and are concentrated in the regeneration cycle. Thus it is occasionally necessary to vent the hot regeneration gas.

All plant water except evaporator feed is softened by ion-exchange units. Salt for regeneration is obtained from waste material at local potash mines and to date has proved satisfactory. Ten to 15 tons per week of this material is used.

Gas enters the plant through two inlet scrubbers, one located at the southeast corner and one at the southwest corner of the plant yard. Suction pressure can be varied from 1 to 10 psig.; however, the plant has always operated at the maximum figure. First-stage cylinders discharge against 60-psig. pressure through air coolers, then water coolers to a scrubber. Only water is trapped in this scrubber.

The second-stage cylinders discharge against 240 psig. through the air and water coolers and the scrubbers to the gas treaters where the gas is contacted with a 12 per cent monoethanolamine solution to remove the hydrogen sulfide and, of necessity, the carbon dioxide. Although the maximum permitted hydrogen sulfide content is 0.25 grain per 100 standard cu. ft. results as low as 0.015 grains have been obtained. Condensate from the second-stage scrubber is pumped through a monoethanolamine wash to the demethanizer, and this wash removes any hydrogen sulfide.

The third-stage cylinders discharge the sweetened gas through air coolers, water coolers, and scrubbers to the absorbers which are operated at 865 psig. In the absorbers the gas is contacted with 530 g.p.m. of 188-molecular-weight oil having a boiling range of 430° to 530° F. The temperature of absorption oil to the absorbers is controlled by refrigeration to 57° F.

Tests have indicated that the absorption process removes from 90 to 97 per cent of the propane in the incoming gas and the propane content of the absorber residue varies from 0.20 to 0.50 mol per cent. Absorber residue gas is then dried with activated alumina to a vapor content of less than 9 lb. per million. The gas is then delivered at the plant fence to the utility company and requires not further treatment for transmission to California.

In the absorption cycle the lean oil is pumped through air-cooled sections, then through water-cooled sections where a side stream is diverted over the reabsorber section of the demethanizer. The remainder passes through a propane-cooled chiller where the temperature is brought to 57° F. if necessary to obtain the desired extraction. High-pressure pumps then discharge the cooled oil over the absorbers.

Rich oil from the absorbers is flashed at 250 psig., the vapors going to the bottom of the reabsorber. The flashed oil is split into two streams, approximately 70 per cent being exchanged with hot lean oil and enters the demethanizer at 250° F., the remainder being introduced at the base of the reabsorber. As indicated above,

TYPICAL PRODUCT INSPECTION DATA FOR EUNICE GASOLINE PLANT

Component--	Raw gas (mol %)	Absorber residue	Nat. gaso. (liq. %)	Butane (liq. %)	Propane (liq. %)
Hydrogen sulfide	0.12	....	....	....	....
Carbon dioxide	0.79	....	....	....	....
Methane	77.55	89.27	....	....	....
Ethane	10.02	7.70	....	....	4.21
Propane	4.95	0.30	....	0.35	95.38
Isobutane	0.52	....	0.00	22.75	0.41
Normal butane	1.84	....	14.24	76.90	....
Isopentane	0.39	....	20.89	....	....
Normal pentane	0.55	....	27.87	....	....
Hexane and heavier	0.61	....	37.00	....	....
Nitrogen and water	2.66	2.73	....	....	....
	100.00	100.00	100.00	100.00	100.00

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lean oil is circulated over the top of the reabsorber. The residue gas from this operation is used for plant fuel and contains less than 1.5 mol per cent propane.

Demethanized rich oil is heated by the hot lean-oil stream and enters the primary stripper which operates at 150 psig. for removal of lighter hydrocarbons and then to the direct-fired heaters where the temperature is raised to 515° F. Final stripping takes place in the secondary stripper at 40 psig. pressure. The lean oil then passes through the exchangers to the surge tank for another cycle.

Products from the primary stripper and the secondary stripper are recombined in a gross surge tank. Since this liquid is more than 50 per cent ethane and propane, it is necessary to recompress vapors from the vessel and discharge them into the reabsorber unit.

The gross product is pumped through a caustic wash and then to the depropanizer column which operates at 300 psig. Ordinarily a sharp split is made between the propane and butane but this can be varied according to the final product desired. The condensed overhead product from the depropanizer is charged to the deethanizer at 550 psig. pressure. This vessel has a reboiler temperature of 190° F. and top temperature of 72° F.

Reflux is condensed as required in propane-cooled chillers. The overhead ethane is the purest product separated at the plant, testing in excess of 98 per cent purity. At present it is burned in the boilers and rich-oil heaters. The propane product from the deethanizer requires no further treatment, not even drying, although dryers are available, if necessary.

The bottoms stream from the depropanizer is charged to a debutanizer where it is split into a commercial butane overhead product and a 20-lb. R.v.p. kettle product. The column is capable of producing completely debutanized gasoline. The butane requires no further treatment, but it is necessary to treat the gasoline with a conventional Perco unit for the removal of mercaptans.

Finished gasoline can be delivered either to truck, tank car, or to pipe line. Propane, butane, and mixtures of the two are disposed of through tank cars and trucks.

Since sweet crude oil is available from one of the formations, a column is provided for manufacturing the absorption-oil requirement as well as reclaiming the used oil.

In the gas-sweetening process a 12 per cent monoethanolamine solution is pumped through coolers and over the two contactors at 90° F. and at a rate of 10 to 15 gal. per 1,000 standard cu. ft. of gas being treated. The acid rich solution then passes to the reactivator which is operated at 15-17 psig. pressure and not over 260° F. Reflux is condensed in an air-cooled unit with a louver arrangement to maintain the condensate at 140° F. The solution has been stripped to as low as 7 grains of hydrogen sulfide per gallon. The plant intake gas is much sweeter than that processed by other plants in the area and little difficulty has been experienced with the unit. However, it was necessary to install an engine-oil-type filter to remove finely divided iron sulfide from the solution.

Water for plant operations is obtained from two water stations having a total of seven wells. The large number of air-cooled units, 23, handle approximately 70 per cent of the plant cooling load. Water requirements for all plant operations are 3,000 to 5,000 bbl. per day. The Eunice plant was built by Hudson Engineering Corp., Houston.

Fractional Analysis

(Continued from page 172)

having correct analyses of the inlet and outlet gas streams—as well as correct analyses of the lean oil and rich oil, together with the temperatures, pressures, and column data, the performance can be calculated and compared with actual performance and trouble, if any, traced down to where it may be corrected.

Checking fractionation.—Fractional analyses of liquids are equally important. Going back to plant operation,

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the efficiency of fractionators can be checked. In the case of making natural gasoline, due to the price differential between butanes and gasoline, it is desirable to include all the butane possible in making a definite vapor-pressure gasoline. For illustration, 26-lb. gasoline might contain a mixture of both iso and normal butane. Here it would be possible by more efficient operation to use only normal butane, if there were sufficient normal butane available, thereby making more gallons of 26-lb. gasoline due to the fact that the vapor pressure of normal butane is less than that of isobutane. To be concrete, if the plant production was 50,000 gal. of 26-lb. gasoline per day, and through improper fractionation the butane content was 10 per cent iso and 20 per cent normal, this production could have been 52,000 gal. if proper fractionation had taken place, provided there was sufficient normal butane to give the required vapor pressure gasoline. Assuming there is a 2-cent price differential between butanes and 26-lb. gasoline, this additional production would amount to approximately $15,000 per year—and that is worth going after.

No analysis is of value unless it is accurate. In a large operation, the cost of setting up and maintaining a good laboratory is negligible in comparison to the savings that might be obtained through properly controlled plant operation. Using the former illustration of a 50-M.M.c.f. plant, if the residue gas contained 1/10 gal. of gasoline, which was not detected through inefficient fractional analysis, this would amount to a $87,600 loss in revenue over a year's time. This would more than pay for equipment of a modern laboratory and its operation in first-class condition.

More Uses of Fractional Analysis

There are other phases where fractional analysis of gas is employed. On the West Coast, much casing-head gas is purchased by plants using fractional analysis as a basis for payment rather than test car. While this has not yet been used in the Mid-Continent area for purchases from leases, fractional analysis has been used as a basis for settlement of purchases between plants.

The following illustrates a case requiring accurate fractional analysis. A combination plant processes both gas from unitized gas wells and casing-head gas from leases which are not unitized. The plant is a cooperative venture where the unit owns a portion of the plant necessary to recover products from the unit gas, and the owners of casing-head gas own a portion of the plant recovering the liquids from the casing-head gas and the two ownerships are different.

The problem is how to divide the production to the proper owners. After considerable study and research, one practice now being followed is to take fractional analyses of both streams coming into the plant and calculate the theoretical recovery of products from each stream under actual average plant operating conditions. The actual plant production is then allocated between the two types of owners in direct ratio to the theoretical recovery of products. Here an error in fractionation will affect the distribution of production, which means dollars, between owners.

In recent years product lines have been built from gasoline plants to refinery markets so that a mixture of gasoline and butanes—and possibly propane, could be sold directly to refiners, thereby avoiding vapor losses and utilizing the most economical means of transportation. In most cases, the product is delivered as a mixture and thereby saves the cost to the plant of separating the gasoline, butanes, and propane into separate products for sale and delivery.

A sample is taken on each delivery for fractional analysis and the volume of 26-lb. gasoline and the volume of excess butanes and propane calculated. Here again, dollars are dependent upon accurate analyses. If a plant is delivering 80,000 gal. each day containing 50,000 gal. of 26-lb. gasoline and 30,000 gal. of excess butanes and propane, an error of ½ mol per cent in the pentane-plus content, with gasoline worth 2 cents more than butanes, would amount to $4,500 per year.

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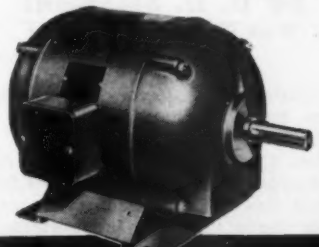

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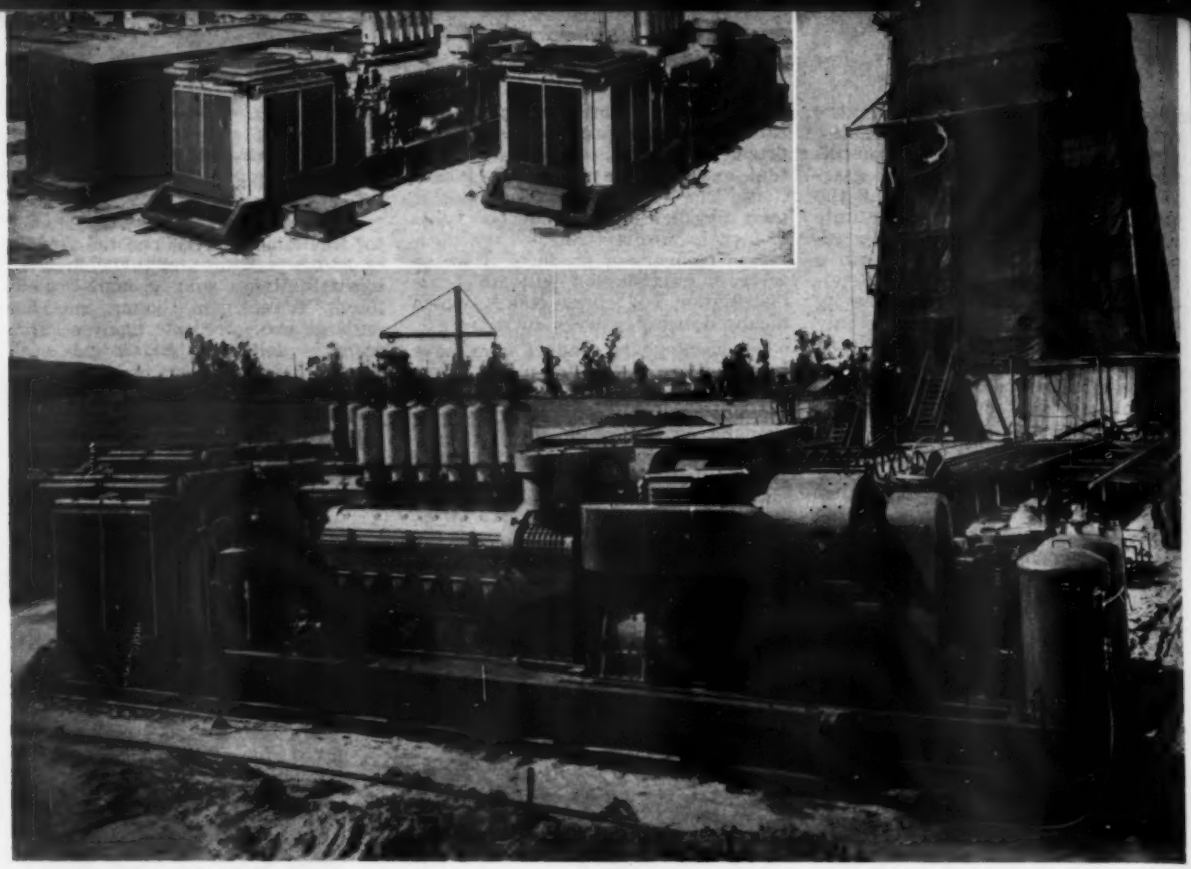


One of the locomotive-type diesel engines which power the new $400,000 rig operated by Standard Oil Co. of California. Rated at 1,200 hp., this 12-cylinder engine plus another identical unit (see inset), are utilized to power direct-current generators. Relatively low-speed operation, 750 r.p.m., permits use of inexpensive industrial-type diesel fuel.

Engineers planned for economical drilling of 15,000 to 18,000-ft. wells, as well as shallower tests in designing this

DIESEL-ELECTRIC DRILLING RIG

Standard of California's new deep-drilling unit is first in new program

by D. H. Stormont
West Coast District Editor

AN unconventional diesel-electric drilling rig, in which several innovations have been employed in the design and arrangement of various units, was recently unveiled in the Baldwin Hills area of Los Angeles County. Rated at 2,400 hp., it is designed for economically drilling 15,000 to 20,000-ft. holes as well as routine drilling of 8,000 to 12,000-ft. wells.

The rig, which is drilling its initial well for Standard Oil Co. of California, is the first unit resulting from the company's decision to convert its steam-driven equipment to internal-combustion-engine drive. Greater portability, improved operating characteristics, and lower maintenance were the chief design objectives of the project.

Two 1,200-hp. locomotive-type diesel engines salvaged from Navy LST's supply the power. These power units drive direct-current generators to supply electricity for the draw works, rotary and mud pumps, motors and for auxiliary uses. The amplidyne control method used to control the output of the draw-works, rotary, and mud-pump motors, and to limit the power which a generator can deliver to a motor, probably is the most outstanding innovation of the rig. Through use of this method of drive and control it is hoped to achieve operating efficiency and sensitivity heretofore unobtainable with conventionally powerered rigs or steam draw works.

The draw works, also an unusual feature of the rig, is located at ground level under the derrick floor, with its position rotated 180° from the normal arrangement so that its front faces away from the hole. Drive is by a 1,500-hp. motor placed in line with the draw works and contained in the draw-works skid.

The rotary table and motor are mounted under the derrick floor on a structure independent of the der-

A clear view of the entire derrick floor is had from the driller's control console. Since the draw works is located at ground level under the derrick floor, the floor is clear of everything except the rotary table, catworks, and the console itself.

Each of these two slush pumps is powered with 500-hp. d.c. motors via silent chain transmissions. The canvas duct shown connected to each slush-pump motor supplies fresh air for purging them of explosive gas should such accumulate during shut-down periods.

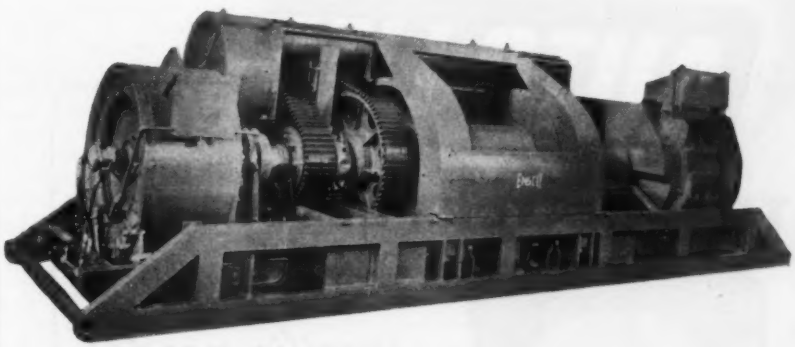
rick substructure. Silent-type chains are used to transmit power to the mud pumps as well as to the draw works.

With the weight of the draw works and rotary-table unit removed from the derrick floor, and the pipe-racking platform supported by an independent structure, the 12-ft. substructure for the 150-ft. derrick consists of little more than corner supports for the derrick. There are no heavy subs such as are found at the usual heavy-duty rig.

The derrick floor is clear of all equipment except the driller's console, catworks, and rotary-table top. The driller, with his skid-mounted control, is located to one side of the derrick floor and has an unobstructed view of the floor. Use of direct-current motors and pneumatic and electric controls permits finger-tip operation of the complete rig by the driller from his console.

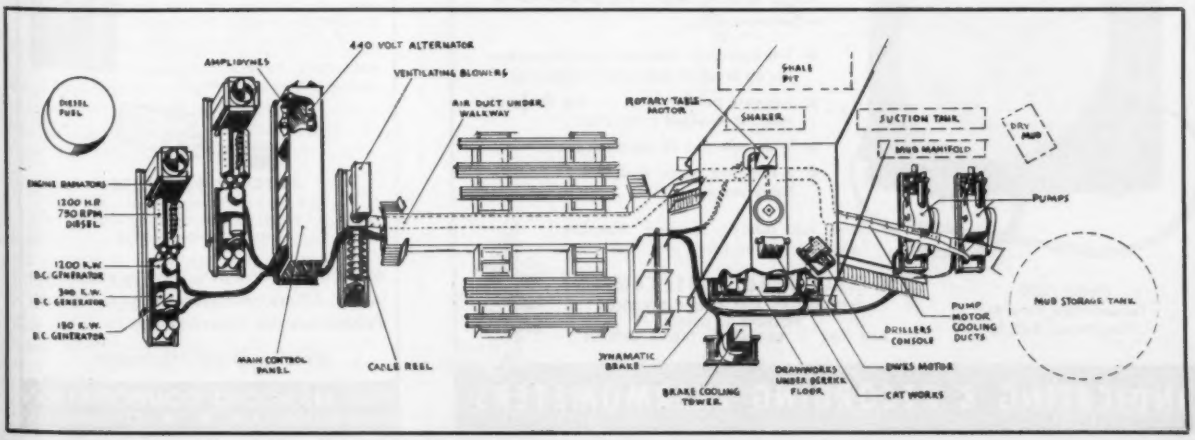
All mechanical and electrical units are mounted on skids. These are designed so that main elements of the rig are quickly dismantled into 12 completely "packaged" or self-contained units to facilitate rigging up, tearing down, and moving As indicated previously, all heavy machinery is set at ground level to facilitate moving operations and to gain increased stability.

During normal drilling operations, either of the two 1,200-kw. main generators may be used to drive a mud-pump motor, and either one of the two 300-kw. generators may be used for rotary-table motor. For hoisting service, the driller parallels the two 1,200-kw. units for driving the 1,500-hp. draw-works motor. In terms of high-gear fast-line pull this provides 29,000 lb. for accelerating, and with eight lines strung, appoximately 10,000 ft. of 4½-in. drill pipe can be



***Right:** View of the two-speed, two-shaft draw works with chain guards removed. A large motor provides maximum horsepower over a wide speed range.*

***Below:** General arrangement of equipment at the new rig of Standard of California.*



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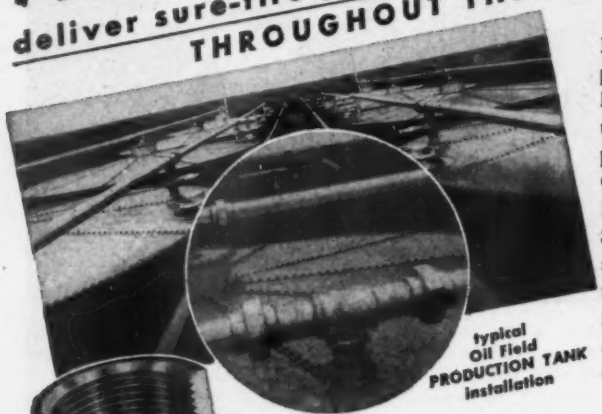

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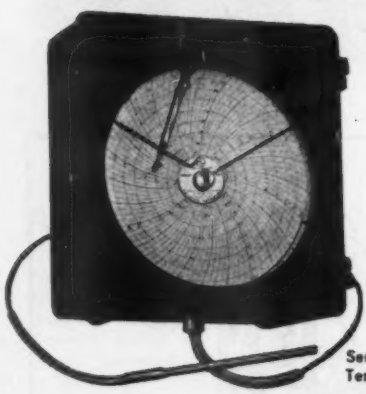

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started in high from bottom. During operation, the rig is exceptionally quiet and free of vibration.

Power-Generating Equipment

Each of the diesel engine-generator sets consists of three independent direct-current generators, two of which are mounted in line with the engine power-takeoff clutch, and the third V-belt driven from the end of the second generator shaft. Generating equipment includes one 1,200-kw., 525-volt unit used for driving the draw works and mud pumps; one 300-kw., 230-volt generator for driving rotary table; and one 150-kw., 125-volt constant potential unit for powering auxiliary units and amplidynes which in turn are used for field excitation of the two larger generators.

A 3-phase, 60-cycle, 440-volt, 100-kva. alternator is provided for supplying a.c. power to rig auxiliaries. These include blower motors, shale shaker, brake water circulation, lighting, and rig heating.

The two salvaged Navy power units are 750-r.p.m., 12-cylinder diesel engines. Originally rated at 900 hp. for continuous service, these engines were completely reconditioned and provided with suitable cooling for the increased horsepower necessary for use with this drilling rig. They are now rated at 1,200 hp. for intermittent duty.

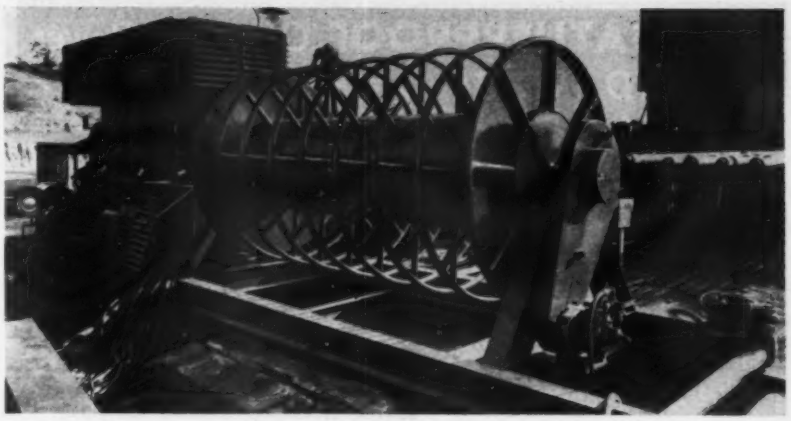
A unique cooling system was developed for the oil-field application of these engines. A fan is mounted at the top of the dual radiator unit and is driven through a right-angle gear box from the engine. One radiator unit is employed for engine cooling, while the other is used for water circulation to the lubricating-oil cooler.

A "day" fuel tank (small auxiliary fuel feed tank) is installed adjacent to the air receiver on the generator end of the engine-generator unit subbase. Fuel is gravity fed from a nearby storage tank. Fuel is maintained at a constant level in the day tank by means of a float-type valve in the inlet line. The fuel is continuously circulated between the day tank and engine to maintain constant fuel temperature.

Due to the use of relatively low-speed engines, Standard of California engineers are using a low-cost industrial-type diesel fuel rather than the more expensive fuel generally used for oil-field service. This should effect substantial savings in fuel costs.

Electrical System

The main control equipment consisting of necessary control and transfer switches, contractors, relays, amplidynes, alternator, and other electrical devices, is located in a separate skid-mounted unit. The arrangement of the electrical distribution system permits maximum operating versatility. The main generator units may be paralleled and the power distributed in any desired combination between the two mud pumps and the draw-works motor.



This skid-mounted power-driven cable reel is used to store more than seven tons of electrical cable during moves. The ventilating blowers which supply purging air to electrical equipment may be seen just beyond the reel.

Two motor units are provided for excitation of the main 1,200-kw. generators (5-kw. amplidyne for each main generator) and the 300-kw. rotary-able generators (2-kw. amplidynes). The two amplidynes are connected together by means of a flexible coupling and are driven by a 15-hp. electric motor. Use of the amplidyne current limit exciter control gives instantaneous response to the driller's control and assures equal distribution of load between the two main generators when they are paralleled.

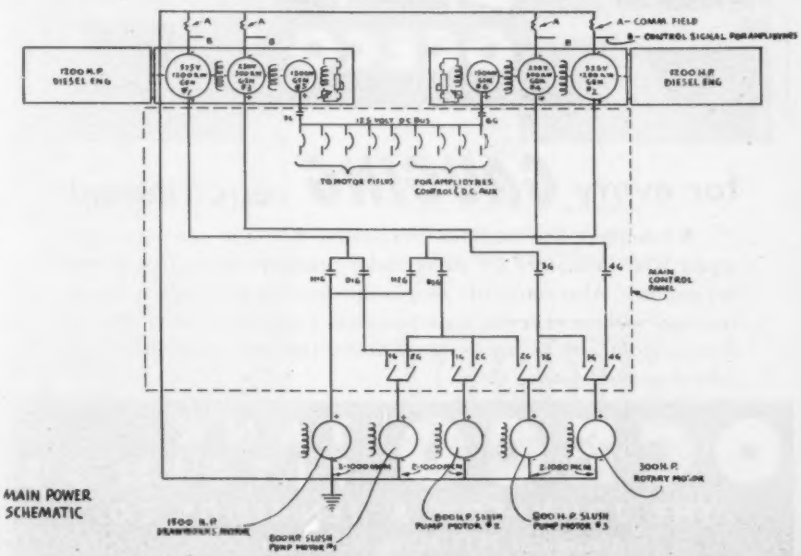
The amplidyne is a direct-current machine, in many respects similar to a d.c. exciter. It was developed by General Electric and has characteristics such that a very small d.c. signal will give a high-speed amplified response that will control the output of main generators very accurately.

The amplidyne is used in conjunction with a magnetic amplifier commonly called the amplistat. This amplistat has no moving parts and provides extremely accurate amplification of a very small d.c. signal.

The amplistat picks up the voltage drop across the commutating field of the generator and amplifies this to a point where it controls the amplidyne. The amplidyne in turn controls the output of the main generators driving the mud pump, rotary table, and draw works. This control system permits the characteristics of the driving motor to match the characteristics of the driven equipment.

This type of control allows the driller to control the output of the largest motors very accurately by turning a small potentiometer dial that is no larger than a radio dial. In addition the use of amplidyne control provides a means of limiting torque on motors as they can be preset to limit the power that the generator can deliver to the motor.

The draw works, taken from an idle steam rig but completely rede-



Schematic arrangement of the rig's main power lines and equipment.

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signed and rebuilt, is placed at ground level to eliminate the necessity for a heavy supporting structure. Also, to keep the drum fast line within the confines of the derrick, the position of the draw works was rotated so that the drum opening faces away from hole.

Driven by an enclosed fresh-air ventilated 1,500-hp., 525-volt, 600-r.p.m. d.c. motor, the draw works is a 2-shaft, 2-speed unit. A direct air-operated friction clutch is provided on the high-speed drive. An air-operated jaw-type clutch, because of space limitations, is used for the low-speed drive. It is expected that the low-speed drive seldom will be used.

The drum is 32 in. in diameter by 57⅝ in. long and is grooved for 1⅜-in. wire line. The low-gear pull of 75,000 lb. on the fast line will handle a maximum hook load of 750,000 lb. with 10 lines strung. Brake rims are 62 in. in diameter and are individually cooled by a forced water-circulating system.

A unique air system is provided for operating the draw-works brakes from the driller's console on the derrick floor. The brakes are 100 per cent air operated. A spring-loaded emergency brake is also provided. This may be operated by the driller in any emergency and is automatically applied in case air pressure should fall below 80 psi. A 60-in. dynamatic electric brake is also provided on the draw works.

Silent chain is used to transmit power to the draw-works shaft. This chain is designed for high speed, heavy-duty applications. It provides an extremely high load capacity per unit of width in addition to greatly minimizing shock loading of chain links. It eliminates much of the noise, vibration, and heating generally associated with conventional oil-field chain drives.

Mud Pumps

Two 500-hp. slush pumps are provided for circulating mud. Either pump may be stopped at the driller's position. For safety reasons, restarting and controlling speed may be done only at the mud-pump master switch position. The mud pumps are driven by enclosed fresh-air-ventilated 765-hp., 500-volt, 1,120-r.p.m. d.c. motors. As in the draw works, silent chain transmissions are used. Motor and slush pump are mounted on a common skid base.

Use of d.c. electric motor-driven slush pumps is expected to reduce pump maintenance considerably. The amplidyne control of the d.c. motor gives a drooping speed characteristic which is ideal for slush-pump service. Preset maximum torque of the mud pump motors will cause the slush pumps to slow down and stall in case of excessive pressure caused by clogged bit or other restriction of the circulating system. This protects the fluid end from excessive pressures and prevents damage to the power end.

Rotary Table

The 20½-in. rotary machine and motor are mounted under the derrick floor on a structure independent of the derrick substructure. The rotary table is placed practically flush with the derrick floor thus providing extremely safe footing for the drilling crew. This eliminates the need for a heavy supporting structure. A universal-joint-type shaft drive is used between the motor and the rotary table. This permits the table to be shifted 2½ in. in any direction.

Use of independent substructure for the rotary table facilitates installation of the blowout preventers since the table can be lifted out and the blowout preventers installed from the derrick-floor level. Drill-pipe setback loads are transferred directly to the ground by means of a special structure which is independent of the derrick floor.

Driller's Controls

All drilling controls are placed in a compact, skid-mounted console set on the derrick floor. The use of both pneumatic and electric controls permits fingertip operation of the complete rig. In addition to the conventional air controls for draw-works clutches, cathead, air slips, etc., electrical magnetic contractors are pro-

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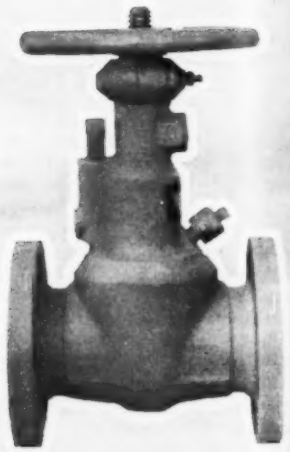

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vided for selecting the various generator drive combinations. The driller may start, stop, accelerate, and switch rotary and draw-works drives at will. He may select either 300-kw. generator for the rotary-table drive.

Speed-control switches are located at the driller's position in fresh-air pressurized units. Each of the various controllers has an infinite number of speeds from zero to maximum, forward and reverse. This arrangement provides an extremely wide speed range and insures instantaneous, accurately controlled speed changes. This is particularly advantageous for the shaft-driven rotary table where speed and torque can be measured and adjusted for changing drilling conditions.

Many safety devices are provided for protection of personnel and equipment. Alarm signal lights are provided at the driller's console to indicate excessive current in any motor. A relay is provided to prevent engine overspeed due to electrical power pumpback in event the draw-works motor is inadvertently connected when running pipe in the hole. This relay is operated by a tachometer mounted on the engine and operates a solenoid valve on the draw-works air brake. An alarm signal operates in case of draw-works motor overspeed. This alarm is actuated by a tachometer on the draw-works motor.

A control also is provided at the driller's position to kill all electric power beyond the load side of the main panel in event of any emergency. The main control-panel doors are equipped with electrical interlocks which automatically deenergize the panel when doors are opened.

Ventilating Provisions

Three axial-flow blowers are utilized to cool motors and to keep a constant supply of fresh, filtered air passing through all electrical units where explosive gases might accumulate. The blowers are located approximately 90 ft. from the derrick and are arranged so that the air is picked up 7 to 8 ft. above ground level. The filtered air passes through a large, canvas duct (located under the pipe walkway) to the derrick substructure where feeder ducts take the air to the draw-works motor, rotary-table motor, mud-pump motors, and the driller's console. This air keeps motors at safe operating temperatures, and eliminates the necessity for expensive explosion-resisting equipment.

The secondary power circuits are electrically interlocked through a time-relay so that the blowers must be started about 2 minutes before motors can be used. This gives sufficient time for the motors and console to be purged of any gas which might have accumulated during a shutdown. The main control panel is also ventilated by means of this forced-draft system in order to keep dust from collecting in the electric relays and other devices. The generators are cooled by a fan located on the main generator unit. This fan draws air through a filter box and discharges it through the three generators making up the engine generator set.

All electric motors are provided with builtin electric heaters to prevent accumulation of moisture in their windings when rig is shut down during high-humidity conditions.

Portability

From the original inception of the drilling rig, one of the basic objectives in its design was to provide a highly portable big rig which could be used with equal efficiency for drilling to most depths. The cost of moving including rigging up and tearing out large conventional equipment is usually substantial. Any time saved in moving from one location to another could very well represent a considerable saving.

The use of diesel-electric power provides many savings in time required for rigging-up and tear-down operations. The power-generating and control units may be set in the most advantageous location. This minimizes excavation work when operating in hilly terrain. All units are self-contained. It is unnecessary to dismantle any chain drives when moving.

Over 3,500 ft. of 1,000,000 circular mills cable (approximately 2 in. in diameter) are used for power connections between generators, motors, and control points. Combined weight of all cables is approximately 7 tons.

A large air-motor-driven reel is provided for storing the electrical cables during moving operations. Electrical connections between generators, controls, and motors may be made quickly and easily in the field. All cables are numbered and coded to facilitate correct coupling, and are equipped with indexing pins to prevent incorrect installation on terminals.

When moving from one location to another in the oil fields, the engine-generator set can be moved as one unit (total weight approximately 96,000 lb.). However, when the unit is to be moved over highways, the engine-generator set breaks down into two separate packages which meet California state road-width, height, and weight regulations. The engine skid's dimensions are 8 by 40 ft. and those of the generator 8 by 28 ft. Permanent alignment is assured between the two units by means of four tapered cones. The engine generator units are designed to set on wood-beam mats, thus eliminating the need for concrete base.

The dynamatic brake and draw-works motor are removed from the draw-works package when it is necessary to keep this unit within road-weight limitations.

Thus, when moving under road-weight limitations, main elements of

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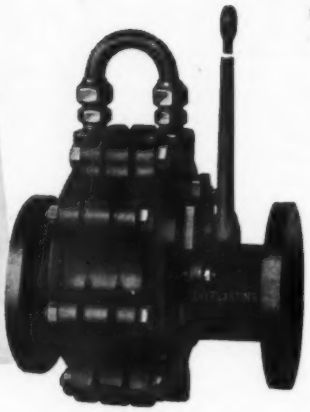

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the drilling rig are quickly dismantled into 12 packages. These consist of one skid-mounted unit for each of the two diesel engines; one for each of the generator units; one for the electrical control panel; one for the draw works; one for the draw-works motor and dynamatic brake; one for the rotary-machine unit and motor; one for the ventilating blowers and power-cable reel unit, and one for each of the two slush-pump packages. When moving without road-weight limitation the number of packages for the same equipment is eight. These are two engine generator sets; one electrical control panel; one draw works with motor and brake; one rotary unit; two pumps; and one blower and cable-reel unit.

The rig represents an expenditure of nearly $400,000 exclusive of drill pipe, derrick, substructure, and other miscellaneous equipment. The two diesel engines, six generators, and four d.c. motors were salvaged from World War II marine equipment. Thus to duplicate the rig using all new equipment would add approximately 75 per cent to the cost. The following list gives the names of manufacturers whose equipment was used.

Major Equipment for Standard Oil Co. of California's New Diesel-Electric Rig

Entire rig—designed, manufactured and assembled by Los Angeles plant, Emsco Derrick & Equipment Co.

Derrick and substructure—15-ft. extended leg-type derrick, 12-ft. substructure, and insulation supplied by Macco Corp.

Draw works—originally a National Supply Co. type 34-62-FE steam draw works—completely redesigned and rebuilt by Emsco Derrick & Equipment Co.

Rotary machine—Emsco type JB-20½ in.
Swivel—National Supply Co. RC-200 ton.
Blocks—Emsco type M-50 crown and traveling blocks regrooved for 1⅜-in. wire line.

Slush pumps—two 500-hp. Emsco type D-500 slush pumps.

Electrical controls and apparatus — General Electric Co.
Engines—Cleveland Diesel Engine Division of General Motors Corp.
Engine radiators—Jackson Engineering Co.
Electric motors and generators—C. Kirk Hillman Co.
Air controls—Westinghouse Air Brake Co.
Dynamatic brake—Dynamatic Corp.
Engine clutch—Fawick Airflex Co., Inc.
Hose fittings and hose—Aeroquip Corp.
Catworks—Foster Cathead Co.
Air slips—Byron Jackson Co.
Air cleaners—Air Maze Corp.
Mufflers—Burgess-Manning Co.
Cooling tower—Parkersburg Rig & Reel.
Air starter—Gardner-Denver Co.
Oil filter—Winslow Engineering Co.
Chain and couplings — "HY-VO" chain drives on draw works and slush pumps; Morflex dual couplings between main generators—Morse Chain Co.

Geological Field Trip

AMARILLO.—A field trip of the Dry Cimarron River Valley, western Oklahoma Panhandle, southeastern Colorado, and northeastern New Mexico will be held May 17-19 by the Panhandle Geological Society.

Reservations are available through Jeanne Allen, Box 110, Amarillo.

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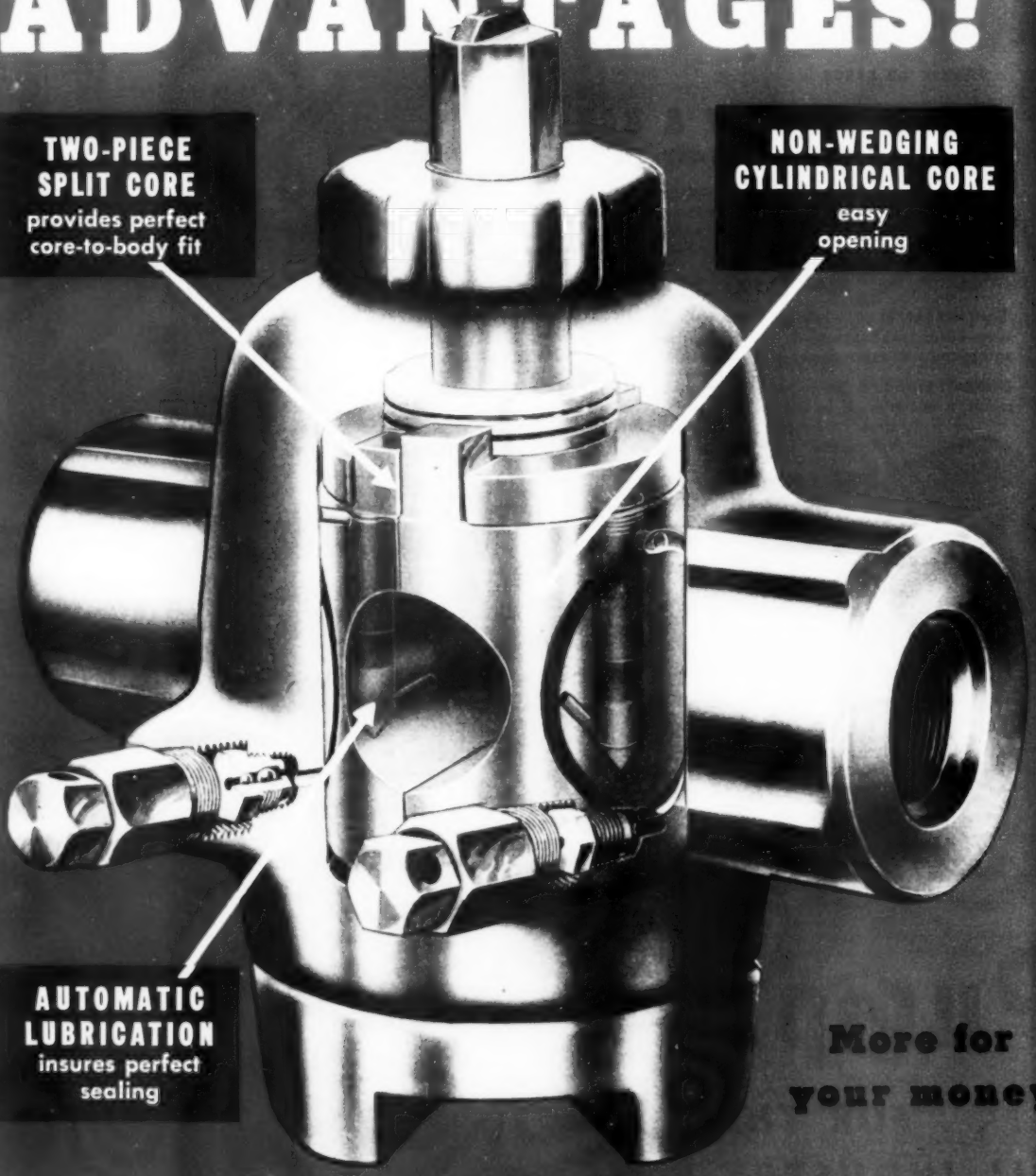

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Left: Located in downtown Colorado Springs, Colorado Interstate Gas Co. uses two-way radio to increase efficiency and effectiveness of its operation. Pressures in the company's pipe lines are recorded on the instruments shown here back of Dispatcher Ted Thomas. Right: Repair Foreman W. J. Lynch of Colorado Interstate uses his two-way car radio to talk with headquarters 15 miles away to report on progress of a repair job.

Two-Way Radio Expedites Colorado Interstate Operations

by W. I. Blount*

COLORADO INTERSTATE GAS CO., headquartered in Colorado Springs, Colo., is using two-way radio-communication equipment to efficiently operate one of the largest pipe lines in the Rocky Mountain area.

The pipe line, totaling over 1,000 miles in four states including main lines and gathering system, has a total of 12 fixed stations using local/remote, 60-watt transmitters and 75 mobile units.

The pipe line consists of two separate routes, each originating in separate gathering fields in different states and both terminating in Denver. The longest one, about 350 miles in length, starts in the gathering fields around Bivins, Tex., and passes through New Mexico and Colorado to Denver. This line has 10 fixed stations, each with a local/remote 60-watt transmitter. The second pipe line starts in the gathering fields around Lakin, Kans., and is on a direct line some 250 miles through Colorado to Denver. This line has two fixed stations, each with a local/remote 60-watt transmitter.

The 75 mobile units are mostly used in the gathering fields where there is no other method of communication. Here the two-way radio communication plays a major role in the operation of the pipe line and saves considerable time and money for the company.

By this means of communication the fixed stations are able to keep in constant contact with service cars which make scheduled rounds to the wells. Thus, if an emergency arises for immediate service or the demand for an increase in gas is needed, the men can be contacted immediately and are on the job with a minimum of delay. This saves the time and expense of waiting until a service car has completed its rounds and returned

*Chief gas dispatcher, Colorado Interstate Gas Co.

The 60-ft. tower for Colorado Interstate's radio communications main transmitting station is atop Cheyenne Mountain (elevation 9,300 ft.). This location, 3,000 ft. higher than the headquarters in Colorado Springs, equals a 3,000-ft. tower and permits the 60-watt transmitter an effective range of about 190 miles.

J. C. Fowler, telephone line-repair crew foreman for Colorado Interstate, uses two-way radio to inform the main office that an emergency telephone-line repair job has been completed and asks instructions for next job. Two-way radio speeds emergency repairs, and reduces time between jobs by eliminating trips back to office for assignments.

Left: Radio Repairman W. J. Zonia uses two-way communication equipment to check with other stations and mobile units operated by the company. Right: Through use of this local/remote 60-watt transmitter, the Denver station can contact with mobile units on patrol immediately when an emergency arises, and can contact the main office in Colorado Springs, 70 miles away, if changes in line pressure are needed.

to the station to be notified and sent out again on an emergency trip.

Mobile units are also installed in cars responsible for the maintenance of the telephone lines and the pipe lines. This permits the crews to continue on from one job to the next without the necessity of returning to the office or station, yet are immediately available in cases of emergency.

The tower for the main transmitting station at the offices in Colorado Springs is located on the highest point of Cheyenne Mountain. The elevation of Colorado Springs is 6,300 ft. above sea level and the 60-ft. tower on top of the mountain is 9,300 ft. above sea level, giving the equivalent of a 3,000-ft. tower—one of the highest in the country. This allows a transmitting radius of 190 miles for the local/remote 60-watt transmitter which like the other communication equipment in this two-way system is made by General Electric.

90 Per Cent Propane Recovery

(Continued from page 168)

space, by injecting L.P.G. into the annular space displacing the water downward and then up through the tubing to the surface. L.P.G. is recovered by injecting water into the tubing thereby displacing the L.P.G. back through the annulus.

The surface pressure of the L.P.G., if stored over water, is proportional to the depth of the L.P.G.-water contact as the system is merely a U-tube with salt water inside the tubing and L.P.G. in the annular space. The surface pressure of the L.P.G. is equal to the difference in the columnar heads of the two fluids. The

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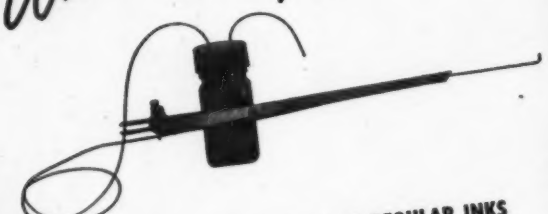

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difference in columnar heads of saturated salt water and propane is about 300 psi. per 1000 ft. Storage of L.P.G. obviously necessitates sufficient pressure to prevent vaporization of the product plus sufficient pressure to conveniently transfer the product or at least furnish adequate pressure to the suction end of a transfer pump. A formation that will support a column of saturated salt water and is at least 700 ft. deep may be used satisfactorily for the storage of 200-psi.-vapor-pressure propane and of course, more shallow formations may be used for the storage of products with less vapor pressure.

The process is deemed practical in formations that will not support a column of water, provided the formation is at sufficient depth. Several schemes may be employed. For example, a second string of tubing with a bottom-hole pump may be employed to remove salt water from the reservoir as L.P.G. is injected into the annular space, thus avoiding excessive pressures on such formations.

Also in formations tnat will not support excessive pressures, L.P.G. may be injected through the tubing under gas at sufficient pressure to maintain the desired surface pressure. Storage in contact with gas, however, will alter the vapor pressure of the stored product which may be objectionable in some cases.

Testing

The storage well operated by Texas Natural Gasoline Corp. in Benedum field was tested only one time before being placed in commercial service. On this test 1,500 bbl. of propane was injected, of which approximately 96 per cent was recovered. This was deemed adequate proof by the operator of the feasibility of the method and the reservoir was placed in commercial service. Approximately 50,000 bbl. of propane (actually 2,086,500 gal.) was stored underground during the summer, and this has been withdrawn at a rate of as high as 20 car loads per day. Of this all but 129,600 gal. has been recovered, so that percentage recovery was 93.79 per cent. No difficulty has been encountered in the injection and withdrawal of this complete storage volume. The propane is on specification, with the exception of a slight trace of moisture.

Applicability

To date, no attempts have been made to apply this principle to formations other than salt but since many shales readily disintegrate in water, it is believed that in many localities, shale beds exist suitable to the process.

Effort is being made to locate all salt deposits suitable to the process, but the study is by no means complete. The Permian salt of West Texas extends into eastern New Mexico, through West Central Oklahoma and Central Kansas almost to the Nebraska line. A sizable deposit exists in western Colorado and eastern Utah and some small deposits are in southern California. Also, extensive salt beds underlie most of Michigan and extend into eastern Ohio, northern West Virginia, western and North Central Pennsylvania, and southwestern New York. The salt domes of the Gulf Coast are applicable to the process.

In consideration of the probable, though untried, applicability to shales and the proven economy of the system in salt beds, it is thought that the formation of underground storage space may alleviate a considerable portion of the L.P.G. storage problem.

The per barrel cost of underground storage of this type for any reasonable capacity is reported to be small, it being understood, of course, that the per barrel cost will decrease as the reservoir capacity increases.

BOOKS

STANDARD SPECIFICATIONS FOR BENZOLE AND ALLIED PRODUCTS. Third Edition. Published by the National Benzole Association, Wellington House, Buckingham Gate, London, S.W.1. 231 pp. 15/9d. postpaid.

The earlier editions of this book were published in 1929 and 1938 and the present publication brings up to date both the specifications and the methods of testing. The main change made in this edition is the inclusion of specifications of lower specific gravities than those previously standardized.

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COMPARISON OF AVERAGE VALUES FROM THREE SURVEYS OF COMMERCIAL AVIATION GASOLINE

Test—	Grade 80 Jan. 1949	Grade 80 Oct. 1949	Grade 80 Oct. 1950	Grade 91/98 Jan. 1949	Grade 91/98 Oct. 1949	Grade 91/98 Oct. 1950	Grade 100/130 Jan. 1949	Grade 100/130 Oct. 1949	Grade 100/130 Oct. 1950	Grade 115/145 Jan. 1949	Grade 115/145 Oct. 1949	Grade 115/145 Oct. 1950
Octane number:							Iso+	Iso+	Iso+	Iso+	Iso+	Iso+
Lean mixture	80.5	81.1	81.1	93.3	92.8	92.6	0.13	0.13	0.16	0.64	0.55	0.59
							Iso+	Iso+	Iso+	Iso+	Iso+	Iso+
Rich mixture	....	87.6	87.8	96.6	96.9	99.0	1.36	1.36	1.36	2.92	2.92	2.92
Tetraethyl lead, ml./gal.	.19	.11	.19	3.31	3.70	3.53	3.83	3.78	3.46	4.45	4.49	4.33
Performance number:												
Lean mixture	....	....	....	....	....	....	105	105	106	119	117	118
Rich mixture	....	....	....	....	....	....	131	131	131	146	146	146
R.v.p., lb.	6.2	6.2	6.6	6.4	6.4	6.5	6.3	6.7	6.5	6.3	6.5	6.5
D86 dist. temp., °F.:												
10 per cent evap.	149	147	145	149	148	148	148	146	147	151	151	149
50 per cent evap.	194	194	194	193	192	192	202	204	206	209	211	212
90 per cent evap.	239	233	239	237	233	235	246	242	244	242	245	250
Sp. gr., 60°/60° F.	.707	.705	.708	.712	.713	.713	.708	.707	.701	.697	.700	.699
Visc., kinematic, 70° F., cp.	.595	.618	.623	.592	.616	.615	.601	.628	.620	.616	.640	.647

National Annual Survey of Commercial Aviation Gasoline

by O. C. Blade*

AVERAGE octane ratings of commercial aviation gasolines produced during October 1950 were as follows:

Grade—	Lean mixture engine rating A.S.T.M. D614	Rich mixture engine rating A.S.T.M. D909
80	81.1 octane No.	87.8 octane No.
91/98	92.6 octane No.	99.0 octane No.
100/130	106 performance No. (isooctane + 0.16 ml. TEL)	131 performance No. (isooctane + 1.36 ml. TEL)
115/145	118 performance No. (isooctane + 0.59 ml. TEL)	146 performance No. (isooctane + 2.92 ml. TEL)

These values vary only slightly from average ratings of commercial aviation gasolines produced during October and January 1949.

Other properties, such as Reid vapor pressure and distillation temperatures, show small variation compared with those properties of the fuels tested in two preceding surveys.

The following table compares data on octane and performance numbers, TEL contents, Reid vapor pressure, distillation temperatures, specific gravities, and kinematic viscosities at 70° F. with those of the two surveys conducted in 1949.

Other test data given in the new Bureau of Mines Report of Investigations 4789 are: copper-dish gum, potential gum, visible lead precipitate, water tolerance, net heat of combustion, aniline point, freezing point, sulfur content, color of fuel, copper-strip corrosion, and acidity of distillation residue.

The data for the report were supplied by 17 manufacturers of aviation fuel who made the tests in their laboratories. Fifty-four samples of commercial aviation gasoline considered typical of October 1950 production are represented. Similar data also are tabulated on 29 samples of aviation fuel for military use only but are not included in the averages. A copy of R.I. 4789 may be obtained by writing to the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh.

*Associate petroleum chemist, U. S. Bureau of Mines, Bartlesville, Okla.

Midland's Conroe Gasoline Plant

(Continued from page 147)

well-pressure gas. A recent analysis of the well pressure gas is:

	Mol per cent
C_1	92.31
C_2	3.86
C_3	2.05
iC_4	0.30
C_4	0.63
iC_5	0.85

The combined volume of vacuum and well-pressure gas (40,000 M.c.f. per day) enters the second-stage suction at 34 psig. (6 psi. interstage pressure loss) and is compressed to 180 psig. and cooled from 270° F. to 95° F. in three parallel, 970-sq. ft. shell-and-tube exchangers with 85° F. cooling water. After being scrubbed the gas enters the third-stage suction at 176 psig. (4-psi. interstage pressure loss) and is compressed to 760 psig. and cooled from 270° F. to 92° F. in four parallel sets of two coolers each with a total of 2,704 sq. ft. After being scrubbed to remove condensate the gas enters the main absorber at 755 psig.

Absorption and Dehydration

The main absorber, 72 in. o.d. by 66 ft. with 24 trays, has two 497-sq.-ft. intercoolers for butane refrigeration located between trays 19 and 20 and 22 and 23 from the top. Oil circulation is 360 g.p.m. of 38° A.P.I., 190 mol. wt. absorption oil, pumped by two 165-hp. gas-engine driven plunger-pump units.

Residue gas from the absorber is scrubbed and dehydrated to 7 lb. of water per M.c.f. per day. This gas is delivered to a gas pipe-line company except for that delivered to the producers for gas-lift purposes. The dehydration unit consists of two, 72-in. i.d. by 24-ft. vertical, fixed-bed type (activated alumina) dehydrators each having a capacity of 25,000 M.c.f. per day. Residue gas heated to 350° F. is used for regeneration and after being cooled is returned to the main residue stream before dehydrating.

Rich-Oil Stabilization

Rich-oil stabilization was planned to eliminate at least 90 per cent of the methane and a proportional amount of the ethane which are synonymous with high-propane absorption. Main absorber rich oil and third-stage condensate are combined at 225 psig. in the rich-oil flash tank; the resulting vapors and deethanizer vent gas join to enter a 30-in. o.d. by 58-ft., 24-tray, high-pressure reabsorber. Residue gas (1,700 M.c.f. per day) from this operation is used for plant fuel.

The enriched oil from 70 g.p.m. of lean-oil circulation over the high-pressure reabsorber combines with liquid from the rich-oil flash tank and rich oil pumped from the low-pressure absorber, to enter the four 2,040-sq. ft. oil-to-oil exchangers. This interchanger heats the rich oil to 310° F. as feed for the top tray of the 215-psig., 66-in. o.d. by 26-ft., 8-tray, rich-oil stripper. The extent of stripping is controlled by varying feed temperature, or base temperature, or amount of stripping steam (600 to 1,000 lb. per hour of stripping steam presently being used). An average base temperature of 330° F. is maintained with 250-psi. steam in an internal heating element.

Vapors from the rich-oil stripper are cooled to 100° F. before entering the 210 psig. 30-in. o.d. by 58-ft., 24-tray, low-pressure reabsorber and are contacted with 70 g.p.m. of lean oil. The resulting residue (800 M.c.f. per day) enters the plant fuel scrubber, and the rich oil is pumped to the inlet of the oil to oil exchangers.

Distillation

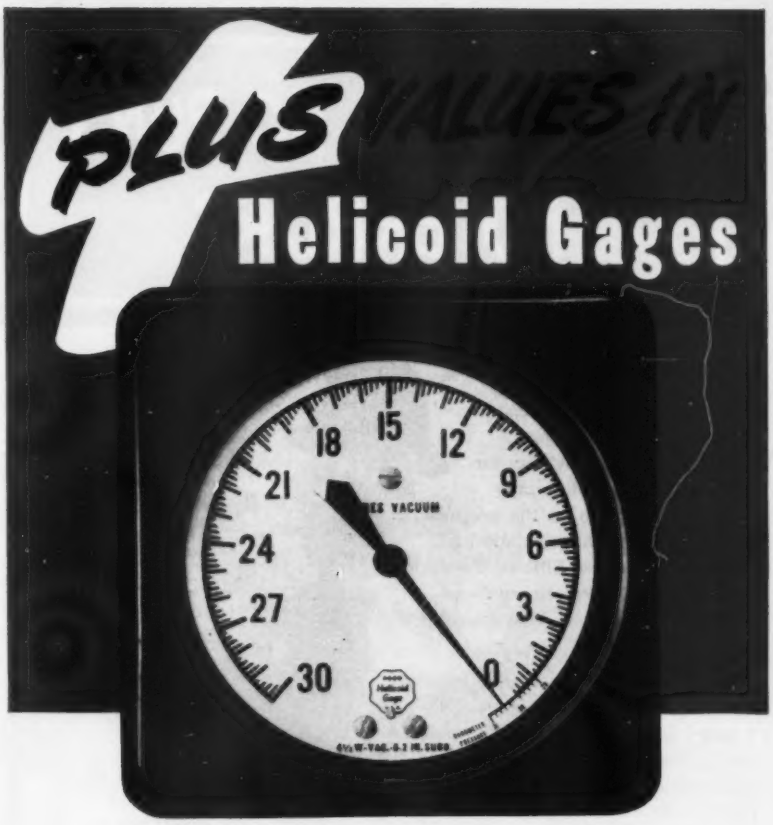
The total rich-oil stream from the rich-oil stripper base passes through one 2,040-sq.-ft. oil-to-oil exchanger and two, 1,000-sq.-ft., 250-psi. steam preheaters to increase the oil temperature to 400° F. The stream then goes as feed to the 125-psig., 66-in. o.d. by 40-ft., 14-tray, high-pressure still. Oil from the high-pressure still bottom at 390° F. is fed directly to the 72-in. o.d. by 57-ft., 21-tray, low-pressure still operated at 40 psig. Lean oil at 390° F. from the low-pressure still interchanges heat with the total rich oil and is then pumped through low-pressure, water-cooled atmospheric sections thence through a butane-refrigerated oil chiller. Part of this oil, 140 g.p.m., is pumped over the two reabsorbers with the remainder going to the oil pumps which discharge over the main absorber.

Approximately 900 lb. per hour of stripping steam affects the necessary removal of light fractions in the high-pressure still to allow total condensation at 40 psig. of low-pressure still vapors. Stripping in the low-pressure still is controlled by 4,000 lb. per hour of superheated exhaust steam. Two 285-sq.-ft., internal, 250-psig., steam coils maintain a 390° F. bottom temperature.

Partial condensation provides 40 g.p.m. of low-pressure still reflux with the remaining low-pressure still vapors being totally condensed and pumped to pass with the high-pressure still vapors through an atmospheric cooling-tower condenser which furnishes 30 g.p.m. of high-pressure still reflux. The remaining liquid is pumped to join the discharge of the 100-hp. recompressor which compresses the noncondensable vapors (250 M.c.f. per day) from the high-pressure still reflux accumulator. The combined product-steam is totally condensed in a 300-sq.-ft., tube-and-shell condenser and goes to the high-pressure raw surge for feed to the deethanizer.

Fractionation

Feed for the 500-psig., 30-in. i.d. by 66-ft., 36-tray, deethanizer is pumped through a 283-sq.-ft. exchanger (vs. final gasoline) and a 40-psig., exhaust-steam preheater to achieve a controlled-feed temperature of 210° F. The overhead vapors are condensed as fully as possible in an atmospheric cooling-tower section and returned to the reflux accumulator where all hydrocarbon condensate is refluxed over the tower and the vent vapors (225 M.c.f. per day) returned to the high-



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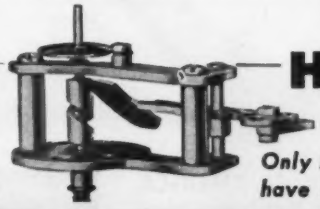

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pressure reabsorber. Deethanizer heat input is controlled by metering a given volume of steam to a 20-in. o.d. by 20-ft., 151-sq.-ft. reboiler. Average operating conditions are a 240° F. bottom temperature and a 105° F. top temperature.

The reboiler product is flashed and then reheated to 228° F. in 15 ft. of steam-jacketed line to feed the 250-psi., 36-in. o.d. by 62-ft., 36-tray depropanizer. Average top temperature is 119° F. and average bottom temperature is 265° F.

Propane as the overhead product is condensed in a shell-and-tube unit to furnish 70-g.p.m. depropanizer reflux with the remainder from the reflux accumulator pressuring to storage. (Average propane production is 27,000 gal. per day.) The steam rate to the 36-in. o.d. by 20-ft., 362-sq.-ft., reboiler is varied by a temperature-recording controller to maintain a constant 130° F. on the ninth tray from the top. The butanes-plus fraction (average production 53,000 gal. per day), from the reboiler is pressured through the 283-sq.-ft. deethanizer feed exchanger and two 150-sq.-ft. final gasoline coolers then to storage.

Experience has proved that a change in the top temperature of the depropanizer (at constant pressure) indicates a change in vapor pressure of the propane, therefore the top temperature serves as a guide for setting the steam rate to the deethanizer reboiler.

Additional deethanizer capacity can be obtained by complete removal of ethane from the rich oil in the high-pressure still. This method of operation would eliminate the necessity of deethanizing the condensed low-pressure still overhead. Then this product would be pumped directly to the depropanizer feed line to join the product from the deethanizer reboiler.

Two complete fractionating columns consisting of a 150-psig., 48-in. o.d. by 63-ft., 36-tray debutanizer and a 250-psig., 30-in. o.d. by 50-ft., 24-tray stabilizer are incorporated into the plant layout. These towers are operated whenever marketing conditions warrant further separation; each is equipped with products lines to storage.

Auxiliary Equipment

Plant storage capacities and operating pressures are as follows: 140,000 gal. at 30-psig.; 75,000 gal. at 100-psig.; 170,000 gal. at 200-psig.; 12,500 gal. of lean-oil storage, and 10,000 gal. of lubricating-oil storage.

The laboratory is housed in a 16-ft. 6-in. by 20-ft. steel building and fully equipped to perform routine tests on products, absorption oils, water treatment, internal corrosion, lubricating oils, gasoline content of field gas, etc.

Two, 250-kw., 440-volt, 3-phase, alternating-current generators, each driven by a 370-hp. engine, provide electrical power with a similar unit in standby service. The electrical control panel provides automatic syn-

chronization through the use of electrically operated, drawout circuit breakers, and overload features to protect both the generators and the individual circuits.

Four, 125-hp., 250-psig. and four, 90-hp., 150 psig., locomotive-type boilers furnish process and power steam. A minimum of 80 per cent condensate recovery is obtained and returned to a common boiler feed tank where chemical treatment is injected.

Cooling Systems

The 29-bay, natural-draft, V-pan type cooling tower (existing in 1948) provides cooling for the closed jacket-water system of the first-stage compressors, distillation, and fractionation equipment. Water circulation over the tower is reduced by recirculating water from the tower basin over the atmospheric sections which cool the first-stage compressor jacket water and condenses the reflux for the stills.

A two-cell, induced-draft cooling tower was installed to cool 3,500 g.p.m. of water 20° F. with a 5° F. approach to an 80° F. wet-bulb temperature. This supplies water requirements of the shell-and-tube gas coolers for the three stages of compression and that of the lubricating-oil coolers for the generator drivers, oil-pump drivers, and second and third-stage compressors.

Jacket water for the second and third-stage compressors, the generator drivers, and the oil-pump drivers is cooled by three radiator-type aerial coolers which operate on a 12,000-gal. closed system.

The closed water systems are made up with steam condensate treated to prevent corrosion. Raw-water requirements for the plant are furnished by two 200-ft., gravel-packed water wells.

The plant as completed has continually met or exceeded design capacities and smooth operations have been easily obtained. High propane recovery has been achieved while the gas volume and the gas content varied considerably from design conditions. This was accomplished by use of: compressor clearance pockets of assorted sizes; allowable absorber pressure range from 700 to 800 psig.; and possible combinations of operating pressures, temperatures, and oil rates of the rich-oil stabilization and distillation systems.

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1. Engineering report on Conroe field, January 1, 1950, by Conroe Operators Association.
2. The Railroad Commission of Texas proration schedule, March 1, 1951.

BOOKS

REVIEW OF ECONOMIC CONDITIONS IN THE MIDDLE EAST. Published by the Economic and Social Council of the United Nations. 135 pages.

This document will be included as a section of the Economic and Social Council's "World Economic Report, 1949-50," which will be published later this year. It includes a major chapter on the petroleum industry to emphasize its importance to the economy of this region. Much of the data regarding oil is drawn from previously published sources but the study is of interest in that the conclusions reflect a nonindustry point of view representing the world's international organization. The report points out what has been done by the oil companies in improving social conditions in the Middle East, but says that petroleum industry's major benefit from the petroleum industry will be derived when the general economic level of the countries is raised sufficiently to make possible an interaction between the oil industry and the rest of the economies. The report further says that royalties and other revenue accruing from oil have been used to only a limited extent for development purposes in the Middle East and that there is therefore "a striking contrast between the huge potential wealth represented by the oil reserves of the Middle East and the current benefits so far derived by the countries to which such reserves are attributed."

CLEANING PETROLEUM STORAGE TANKS. Section B—Gasoline Tanks. Published by American Petroleum Institute, 50 West Fiftiethy Street, New York. 15 pp. 75 cents.

Revised and brought up to date, this manual contains considerable information of value to supervisors and foremen responsible for the safety of men and equipment in the cleaning of storage tanks. It replaces the first edition published in 1942. Section A, the companion piece, deals with the cleaning of storage tanks which have contained unfinished petroleum products. Illustrated with sketches and drawings, the booklet details the hazards of tank cleaning, and covers such topics as ventilating and vapor freezing, testing for vapor, disposal of sludge and sediment, repairs, personal protection, and masks.

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Jet Eductors Handle Gasoline Dyes For Standard Oil of California

Condensed from ETHYL NEWS with permission of Ethyl Corporation.

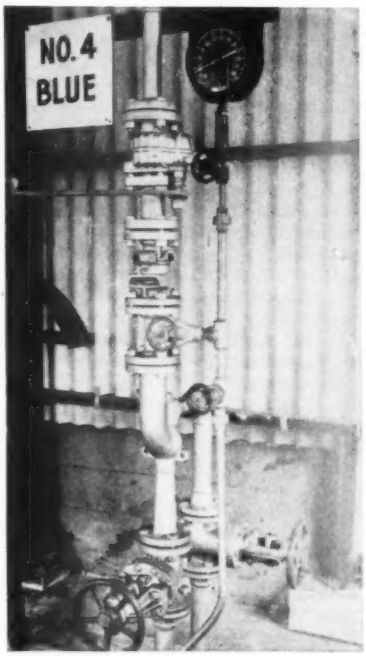
A system for handling light, easily scattered, and extremely penetrating gasoline dyes which has attracted considerable interest among refiners is that installed by the Standard Oil Company of California at its El Segundo refinery. This system makes use of SK 1½" Fig. 222 Jet Eductors to transfer the dye, with the gasoline blend serving as the motivating, or driving, fluid.

A container of dye is placed on a scale and weighed. If, for instance, 300,000 gallons of motor fuel are to be dyed, and the dye requirements are 1.5 grams per 100 gallons, then 4,500 grams or about 10 lbs. of dye are necessary. With the proper color dye on the scale, the operator notes its weight and the reading at which he should stop the addition of dye. He inserts a flexible hose into the dye container, opens the eductor valve, and draws the proper amount from the container. After the required amount of dye has passed through the eductor, "wash" gasoline is flushed through the eductor and its connecting lines to clean them. The balance of the mixing operation—to obtain a proper proportion of dye to gasoline—is completed in the storage tank.

Separate eductors are used for each color of dye in order to avoid improper mixing. In addition, this system allows the use of individual scales for each color permitting the use of sensitive scales and avoiding the necessity for multiple handling of dye barrels.

Standard of California has found a number of advantages in its system. Dyes can be weighed accurately and added to gasoline without spilling. Time is saved by avoiding the intermediate step of making dye solutions. Turbulence in the eductor and loop lines provides sufficient mixing to put the dyes into solution. And, the system provides ease in operating and cleaning, adequate facilities for storing and handling dyes, and economical operation.

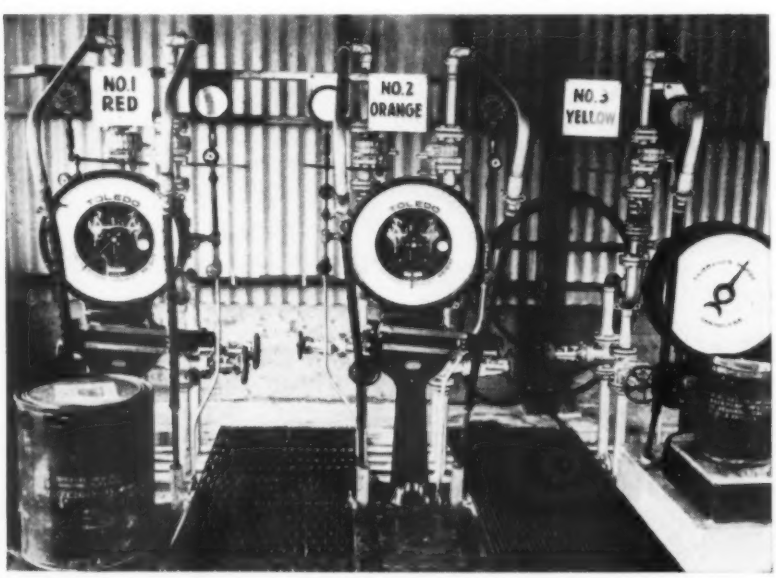
For complete details on SK Jet Eductors, request Bulletin 2-M.



▲ Closeup of an SK Fig. 222 Jet Eductor as used in Standard Oil of California's Dye Handling System.

BULLETIN ON HEAT TRANSFER

SK Bulletin HT-1 pictures and describes standard heat exchangers, generator air coolers, feed water heaters, oil heaters, straight tube evaporators and duplex strainers. Dimensions for various sizes are included in tabular form. Copies available on request.



◀ Photo shows three of the dye eductor manifolds with adjoining scales.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Propane as an Engine Fuel

Is the propane that we hear so much of for engines, a real competitor of gasoline?—P. C. R.

The present interest in propane as an engine fuel arises largely because of increasing competition in the bus industry and because of the increasing use of high-compression engines. When propane can be readily obtained and at a low price, it can be used competitively against diesel fuel and gasoline. Its heating value on a gallon basis is about 75 per cent of that of gasoline but the greater efficiency of operation with the propane fuel somewhat makes up for this deficiency. Inasmuch as most of the engines used to date for operation on propane have been modified gasoline engines, it is probable that any extensive use of propane will depend upon the perfection of engines better suited to its use.

In most localities, propane is not readily available and it is doubted that the large investments in transportation and storage facilities will be undertaken in the immediate future. Propane requires the use of 300 lb. or heavier containers because of its high vapor pressure of 200 psi. (at 100° F.). Meanwhile, certain truck and bus operators, working out of or through refinery districts, will find it feasible to modify their engines and engine feed systems. The danger involved in handling and developing the use of a high-pressure fuel such as propane can also be best undertaken by the operators of fleets of units.

Enormous amounts of propane can be recovered at refineries and natural-gasoline plants. However, the quantities that can be recovered are less than current gasoline production, and the amount actually being recovered at the present time is relatively small.

Asphalt Indexes

What is the penetration index of an asphalt and what other ways of judging the temperature susceptibility of asphalts are available?—W. C. P.

The two main indexes are called the penetration index and the softening point penetration index. Both involve the penetration at 77° F., with a load of 100 g. applied for 5 seconds, and the ring-and-ball softening point. The general relationship between the two indexes is shown in Fig. 1. The general ranges of some common asphalts are indicated. The large range indicated for Venezuelan asphalts is somewhat misleading because it is based on many crude oils rather than those particular crude oils that are widely used for asphalt manufacture. Venezuelan asphalts are usually considered as being intermediate between Mexican and Californian asphalts. Note that thermally cracked asphalts lie at one extreme and oxidized or air-blown asphalts at the other extreme. The oxidized asphalts are characterized by some degree of elasticity and plasticity, whereas cracked asphalts usually have poor durability but have a better adhesive quality in the presence of water. The position of the various distillation (steam or vacuum) asphalts between the two extremes indicates little about the qualities of these asphalts except perhaps the elasticity and thixotropy. Thus, the indexes are useful primarily for classification or identification purposes, except with respect to air-blown or cracked asphalts.

A chart for determining the softening point penetration index[1] is shown on this page but the penetration index nomographic chart is not shown.[2,3] The penetration index can, however, be estimated from the relationship of Fig. 1.

Susceptibility factors are employed to indicate the rate of change of penetration with temperature. Susceptibility factor "A" is the ratio of the penetration at 77° F. (100/5) to the penetration at 32° F. (200/60), whereas factor "B" is for penetrations at 115° F. (50/55) and 77° F.

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2. Pfeiffer and Van Doormaal, J. Inst. Pet. Technology, 22, 414 (1936).
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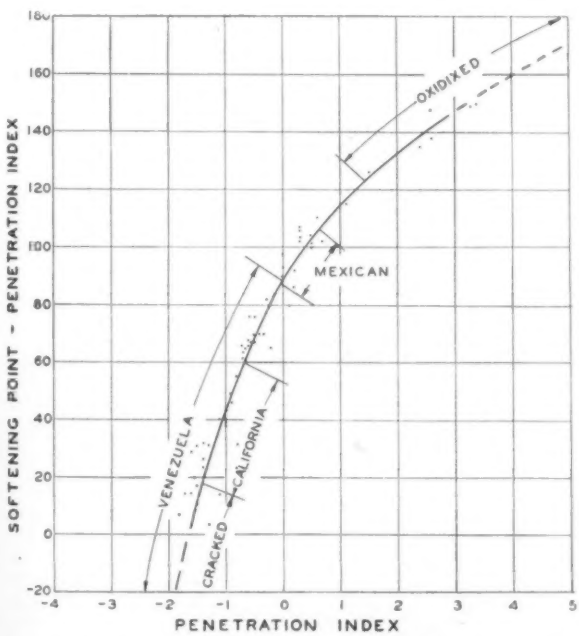


Fig. 1—Relation of softening point-penetration index to the penetration index.

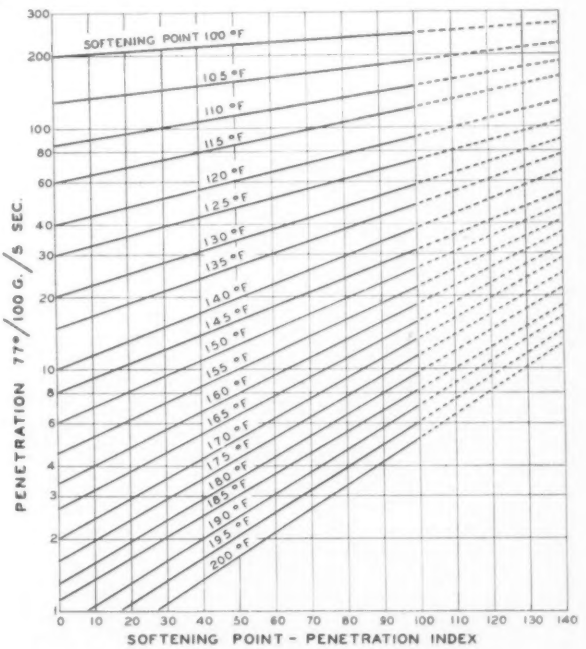
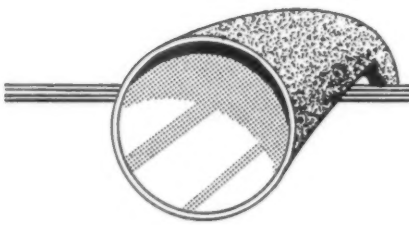


Fig. 2—The softening point-penetration index.



CORROSION

and its control

Cathodic Protection of Condensers And Heat Exchangers

FOUR general methods are available for attacking a specific corrosion problem: (1) the substitution of a more resistant metal or alloy for the part suffering from corrosion; (2) treatment of the corroding medium so as to render it less aggressive; (3) application of a coating to separate the attacking medium and the surface being damaged; and (4) cathodic protection. These four methods are by no means mutually exclusive; more often than not a combination of two or more of them is found superior to any one alone. An example is the use of coating plus cathodic protection on pipe lines.

Only one of these four techniques is definitely ruled out for the protection of the cooling-water side of condensers and heat exchangers; coatings as they are usually known are impractical, for the reason that a good electrical insulator is also a good heat insulator, and the reduction in effectiveness of heat transfer defeats the primary purpose of the equipment.

Treatment of the corroding medium is sometimes practical in heat exchangers, and in condensers using a closed cooling-water system; but where the water is used only once, the volume handled is too great to be conditioned at reasonable cost.

The classic approach to the problem of condenser-tube corrosion has been the use of metals or alloys which show a superior resistance to attack. In the large majority of cases this has proved quite successful, at least insofar as the tubes themselves are concerned. Many of the brasses and bronzes employed are particularly well adapted to this service because of their high heat conductivity, and, in fact, none of the alloys so used have heat conductivities low enough to be significant.

One difficulty encountered, however, has been galvanic or bimetallic corrosion set up by the presence of the alloy tubes and steel tube sheets, headers, and shells. In these combinations, the tubes themselves are invariably cathodic, so that the attack is directed against the steel parts. The tube sheets being the nearer parts are most often the more strongly attacked. Substitution (at considerable cost) of resistant alloys for the tube sheets transfers the attack to the shell, where the reduced relative area of the anodic section makes the attack all the more violent.

This condition has been successfully combated by the installation of magnesium anodes in the water box. The protecting current will not "throw" more than two or three diameters down the tubes themselves, so the cathodic protection alone is not a satisfactory solution. If, however, a suitably resistant alloy can be found for the tubes, the cathodic protection can be used to overcome the galvanic potentials between the alloy and steel sheets and headers, and a more economical design effected thereby.

Anodes in the form of threaded lengths of an extruded magnesium alloy rod (trade name "Galvo-Rod") may be mounted by threading into half-collars welded in place inside the water box, at locations so spaced as to give reasonably uniform distribution of current to all the surfaces requiring protection. Similar rods may be installed in special internally threaded pipe plugs screwed into threaded openings in the shell. This simple installation does not afford any means of measuring or controlling the current output, however, and the degree of protection obtained and the life of anode expected must both be estimated. No great hardship is involved, since equipment of this nature is usually opened for inspection at regular intervals under any circumstances.

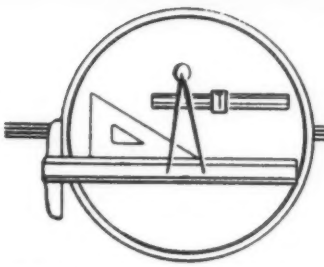
As a preliminary estimate, the exposed area of metal (not including the tubes) should be provided with 10 ma. per square foot—a value which may be changed later on the basis of experience. The current output of each anode will depend largely on the electrical conductivity of the water; this in turn may be estimated from the total dissolved solids as shown by a chemical analysis. Since this information is usually available it forms the most convenient basis for estimating. If the 1.315-in. magnesium rod (1-in. pipe size) is being used, the current output may be approximated by:

$$\text{I (ma. per foot of rod)} = \frac{\text{p.p.m. total dissolved solids}}{13}$$

The foregoing relation is only a rough approximation of the steady-state current flow after initial polarization to protective potentials has been obtained. The total output of 1.315-in. rod may be estimated at 60 ma.-years per foot, from which an estimate of the anode life may be made. The equipment should be opened for inspection (unless scheduled sooner) after about half the estimated anode life has elapsed, and the anode consumption estimated by visual inspection or by weighing. From this a revised estimate of the expected life may be made, as well as an approximation to the actual current being obtained.

Recently there has been introduced a 17-lb. slab-type anode, designed to be attached to a flat steel surface by means of a single ½-in. stud or bolt. Excessive current flow to the immediately adjacent surface, with attendant loss of anode material, is prevented by using a sheet of rubber or saran beneath the anode. If the water resistivity is unusually low, as would be the case with sea water, for example, it may be advisable to limit the current output of the anode in order to obtain reasonably long life. For these conditions there is available an insulating washer with a self-contained resistor—several values being available—to be used under the nut holding the anode. By this means the resistor is included in the circuit, and the current flow thereby reduced to the desired value.

Part 8 of a series by Marshall E. Parker, consulting engineer, Houston.



ENGINEERING

No. 440 *fundamentals*

Method of Finding Contributory Surface Area For a Gas Well From Performance Data

ALTHOUGH the volumetric method is employed in the calculation of the volume of gas originally in place in a reservoir, engineers make use of performance data as soon as initial transient pressures are passed and a sufficient amount of gas has been withdrawn to effect an appreciable pressure decline. The data required for calculating gas reserves by this method includes: the initial reservoir pressure, the current reservoir pressure, the total gas withdrawals during this pressure drop, reservoir temperature, and specific gas gravity.

MacRoberts[1] has observed that the Monroe, Louisiana, gas field contains areas exhibiting pressure transient time in the order of years. This has produced the anomaly of a field effectively depleted in one portion but with nearly original pressure in another even though both were connected. The pressure distribution in a producing gas reservoir is influenced by permeability and properties of the reservoir fluid; correspondingly the average reservoir pressure for a particular set of conditions is a problem distinct from that given here. Accordingly, after a solution of the cited problem, the question arises as to whether a measurement is made of the over-all size of the reservoir or the effective contributory area of a well in a large, continuous reservoir.

Obviously, in low-permeability gas reservoirs, especially where dissected into small segments by faulting, appreciable pressure declines may be observed within a matter of months with only nominal withdrawals. Hence the value of running bottom-hole pressure tests early in the life of a gas well. The early application of performance data to a low-permeability reservoir may suggest spacings different from those originally anticipated or may dictate a delay in development until additional information is obtained on reservoir behavior.

Performance may be used to verify the size of fault blocks in Gulf Coast reservoirs by determination of the reservoir volume required to contain the original gas volume. Usually, the net effective pay is known from core and/or electrical log data, hence the effective contributory area can be calculated.

A sample problem is given below to illustrate this technique:

Problem: Calculate the effective contributory area of a gas well producing from a homogeneous sand lens 10 ft. thick. A total of 36,000 M.c.f. (measured at standard conditions) has been withdrawn during a pressure drop of 674 psig.; the original bottom-hole pressure was 3,212 psig. Bottom-hole temperature is 156° F., gas gravity is 0.75, porosity is 21 per cent, connate water is 55 per cent, and permeability to air is 15 md.

Solution:

$P_1 = 3{,}212$ psig. $\quad Z_1 = 0.815$
$P_2 = 2{,}538$ psig. $\quad Z_2 = 0.790$

Gas production during $P_1 - P_2$ interval = 36,000 M.c.f.

Original gas in place

$$= 36 \div \frac{P_1/Z_1 - P_2/Z_2}{P_1/Z_1} \qquad (1)$$

(Substituting)

$$= 36 \div \frac{3{,}227/0.815 - 2{,}553/0.790}{3{,}227/0.815}$$

(Combining)

$$= 36 \div \frac{3{,}960 - 3{,}232}{3{,}960}$$

$$= 36 \div 0.1838 = 195{,}000 \text{ M.c.f.}$$

Barrels reservoir space per M.c.f.

$$= \frac{5.036\, T_R\, Z_R}{P_R} \qquad (2)$$

(Substituting)

$$= \frac{5.036 \times 616 \times 0.815}{3{,}227} = 0.776 \text{ bbl./M.c.f.}$$

Reservoir space

$$= 0.776 \times 195{,}000 = 151{,}320 \text{ bbl.} \qquad (3)$$

Hydrocarbon space

$$= \frac{43{,}560}{5.61} \times f \times (1 - S_{c.w.}) \qquad (4)$$

where
Porosity = f = 21 per cent
Connate water = $S_{c.w.}$ = 55 per cent at 15 md.

Available hydrocarbon space

$$= 7{,}758 \times 0.21 \times 0.55 = 896 \text{ B/AF}$$

Available hydrocarbon space filled by original gas reserve at reservoir conditions:

$$\frac{151{,}320}{896} = 169 \text{ AF} \qquad (5)$$

If net effective pay = 10 ft. then the effective contributory area is 169/10 or 16.9 ac.

The derivation of the volume factor for gas employed above in Equation 2 is as follows:

Definition: volume factor is the space in barrels occupied under reservoir conditions of P psia. and T° abs. of 1,000 cu. ft. of gas measured at 60° F. and 14.7 psi.

Barrels reservoir sp./M.c.f.

$$= \frac{1{,}000}{5.614} \times \frac{(P_b)}{(P_R)} \times \frac{(T_R)}{(T_b)} \times \frac{Z_R}{1}$$

where
5.614 = number cu. ft. in 1 bbl.
P_b = pressure at standard conditions
P_R = pressure at reservoir conditions
T_b = temperature at standard conditions
T_R = temperature at reservoir conditions
Z_R = compressibility at reservoir conditions

(Substituting)

$$= \frac{1{,}000}{5.614} \times \frac{14.7}{P_R} \times \frac{T_R}{520} \times Z$$

(Simplifying)

$$= \frac{1{,}000 \times 14.7 \times T_R \times Z}{5.614 \times 520 \times P_R}$$

(Combining)

$$= \frac{14{,}700 \times T_R Z}{2{,}919\, P_R} = \frac{5.036\, T_R Z_R}{P_R}$$

Reference

1. MacRoberts, D. T., "Effects of Transient Conditions in Gas Reservoirs," address before the Dallas meeting of A.I.M.E., October 4-6, 1948.

By Joseph A. Kornfeld, District Editor, Tulsa

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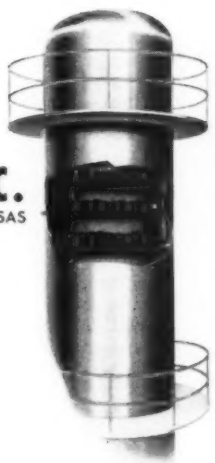

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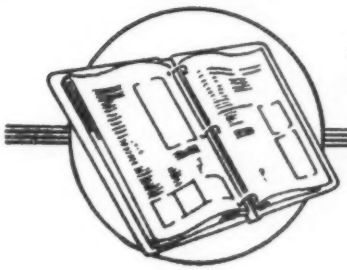


THE REFINER'S notebook

No. 67

Characteristics of Petroleum Oils Used in Grease Manufacture*

THE characteristics of the petroleum oil, both physical and chemical, used in grease manufacture may have important effects on the characteristics of the grease.

Physical Properties of Oil

The principal physical properties usually considered when selecting an oil for grease making are: (1) viscosity or the measure of the oil's resistance to flow; (2) viscosity index or measure of the change that occurs in the oil's viscosity with change in temperature; and (3) the pour point or the temperature at which an oil ceases to flow or pour.

Viscosity.—Because the apparent viscosity of the grease in a moving bearing approaches that of the oil used in it, the viscosity of the oil determines the viscosity of the grease in action. In similar fashion the v.i. helps to determine the viscosity of a grease at any particular temperature.

Dispensability.—These two properties of the oil are also important in establishing the "dispensability" of the grease. Dispensability as used here may best be defined as a characteristic of the grease that is important to its use in grease-dispensing systems. The term includes the idea of "pumpability"—the ease with which the pump in the system can force the grease through the dispensing pipes; plus "slumpability"—the ease with which the grease passes or "flows" from the reservoir into the pump. Oils that are too viscous or stiff at the temperature of operation of the grease pumping system can cause much trouble and expense because of failure of the lubricant to reach the points where it is needed. A condition of this kind is often difficult to detect until after damage has been done.

Lower temperature range. — The effect of the petroleum oil in a grease is usually more evident in the lower temperature ranges. Here a heavy oil may make a grease that is too stiff; that channels during low temperature of operation. Greases containing oils that become highly viscous at lower temperatures tend to become unduly stiff under winter weather conditions. However, the soap lattice structure influences this factor and some greases may be usable at temperatures considerably below the pour points of the oil in them. Actually, the viscosity ranges and other properties of oils that can be used effectively with different soaps vary considerably.

Bleeding.—One further effect of the viscosity of the oil on a grease lies in the tendency of the oil to "bleed" from the mixture if an oil of too low a viscosity, for the kind and amount of soap, is used. Under the "sponge theory" of grease action, it was assumed formerly that it was essential for the oil to bleed from the soap lattice onto the bearing surfaces while the grease was in use. However, this idea has been discarded and properly made modern greases should exhibit no tendency to bleed under ordinary conditions. On rare occasions it may happen than an ordinarily stable grease stored in a deep container under favorable conditions of temperature will show a small amount of free oil rising to the top of the container. If this should happen, a little stirring should reunite the oil with the body of the grease. The product is then ready to use and should show no further tendency to bleed.

Chemical Properties of Oil

Chemical characteristics of the petroleum oil that have the greatest influence on the character of the resulting grease are: (1) the stability of the oil toward oxidation; and (2) the compatibility of the oil, or its ability to mix properly with the soap to give a product with the typical soap lattice structure.

Oxidation.—One of the greatest enemies of any lubricant is oxygen, which tends to combine with it under conditions of operation and destroy its chemical identity. In the case of greases this is extremely important, since even small quantities of oil-oxidation products (organic acids, etc.) can cause rapid breakdown of the grease structure. Oxidation in greases is especially important in the case of "life sealed," prelubricated antifriction bearings where the grease must maintain its lubricating qualities at maximum efficiency for long periods of time without replacement. In such instances, highly stable petroleum oils must be used and these are usually fortified with antioxidant additives.

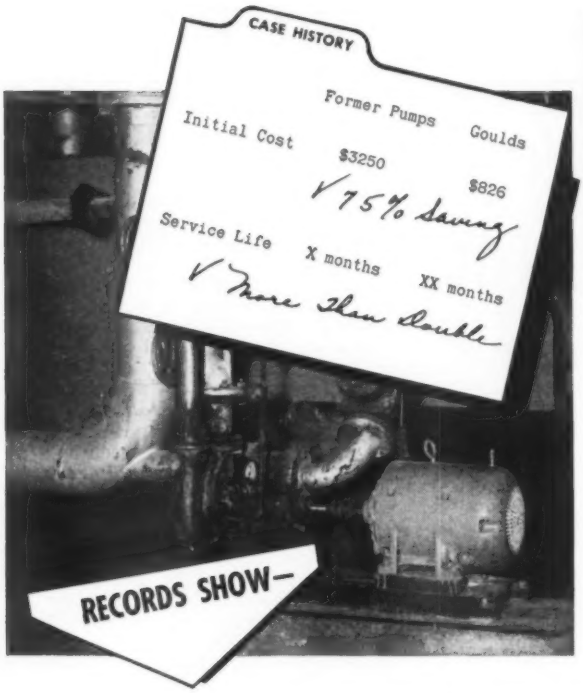
Oils containing excessive quantities of small-molecule aromatics tend to dissolve the soap lattice structure. On the other hand, a certain amount of aromatic hydrocarbons combined with long side chains seems to assure better compatibility than do the more highly paraffinic oils. Further aspects of oil-soap "compatibility" are still in the stage of laboratory study.

Water and Glycerin in Grease

In addition to the effect of the physical and chemical properties of the petroleum oils used in grease manufacture, water and glycerin may be present and may influence grease characteristics somewhat. Water and glycerin are formed in a grease during manufacture if the fat is saponified in the grease-making kettle. Under the usual manufacturing procedure, the mixture is kept hot enough to assure evaporation of the water, except in the case of ordinary calcium grease, where as noted previously, a certain amount of water of hydration is necessary to enable the formation of the soap lattice structure, and to keep the soap and oil from separating.

The effect of glycerin in greases is sometimes important. Certain experimenters have found that the presence of glycerin in some types of soda-base grease is necessary to ensure a stable product. Aluminum greases, on the other hand, are usually made from aluminum stearate which means that the saponification step has been completed, and the glycerin eliminated before the grease-making step is begun.

*From material prepared by Shell Oil Co. on "Fundamentals of Lubricating Greases."



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PIPE LINES

P. G. & E. Seeks More Gas

WASHINGTON. — Pacific Gas & Electric Co. has applied to the Federal Power Commission for authority to increase the capacity of its Topock, Ariz.-Milpitas, Calif., pipe line by approximately 150,000,000 cu. ft. of natural gas per day.

The company plans to construct an aggregate of 141 miles of 34-in. parallel sections along the existing Topock-Milpitas line, and add 22,780 hp. in compressor capacity at authorized stations. Total cost is estimated at $19,391,000.

The additional capacity, the company said, is needed to meet the load growth in its existing service area, which includes 28 counties in central and northern California. The additional 150,000,000 cu. ft. of gas would be obtained from El Paso Natural Gas Co. Pacific is already authorized to receive 400,000,000 cu. ft. of gas daily from El Paso for transportation through the existing line.

El Paso now has two applications pending before the commission for an expansion of its system in New Mexico and Arizona to supply the additional gas to Pacific.

Comanche System Acquired

BARTLESVILLE, Okla. — Cities Service Pipe Line Co. has announced purchase of Comanche Pipe Line Co. properties in Texas, and at the same time revealed plans to build a gathering system in Kansas.

The system purchased by Cities Service is located in Pecos County, Texas, and serves Santa Rosa, Orient, and Pecos Valley oil pools. It has been operated by W. H. Waldrop of Monahans, Tex., under the name Comanche.

Oil from the pools will be delivered to Texas-New Mexico Pipe Line Co.'s Lehn-Apco junction for Cities Service. Purchase price was not revealed.

The construction of the Kansas gathering system, to begin as soon as pipe is delivered, will furnish an outlet for crude from Bartholomew pool of Sedgwick and Kingman counties. Cities Service Pipe Line will lay gathering lines in the field and construct necessary station tankage. Texas-Empire Pipe Line Co. will construct a trunk line from the terminus of the gathering system to Service Pipe Line Co.'s Haven station.

Microwave System Planned

NEW YORK.—Plans for an extensive and modern microwave communication system to expedite the flow of natural gas from Louisiana and Texas fields to the east have been revealed by Texas Eastern Transmission Corp.

The system will extend about 1,400 miles from company headquarters at Shreveport to Kosciusko, Miss., thence along the route of the new 30-in. line now under construction to Connellsville, Pa., to terminate at Linden, N. J. Pulse Time Modulation Multiplex equipment developed by Federal Telephone & Radio Corp., of Clifton, N. J., will be employed in the system.

Spraberry Outlet Planned

MIDLAND, Tex. — Construction of another crude outlet for the Spraberry producing area in Midland, Glasscock, Reagan, and Upton counties in Texas will begin as soon as pipe can be obtained. In an announcement of the new line released by Phillips Petroleum Co., it was stated that final details of ownership of the system have not yet been determined, but a joint venture of Phillips and Cities Service Oil Co. with the former as operator is contemplated.

The system will consist of a trunk line and gathering system. The trunk line will run from a central point in the fields to a connection with the Basin Pipe Line System and the new West Texas-Gulf line connection in Midland, and a hookup with Phillips' 12-in. main line at Goldsmith in Ector County. Size of pipe has not been definitely decided, but it will be at least 8-in. and possibly 10 or 12-in.

Construction of a 4-in. gathering system in the southeastern part of Tex Harvey field is already under way, and a number of producing wells will be hooked up immediately.

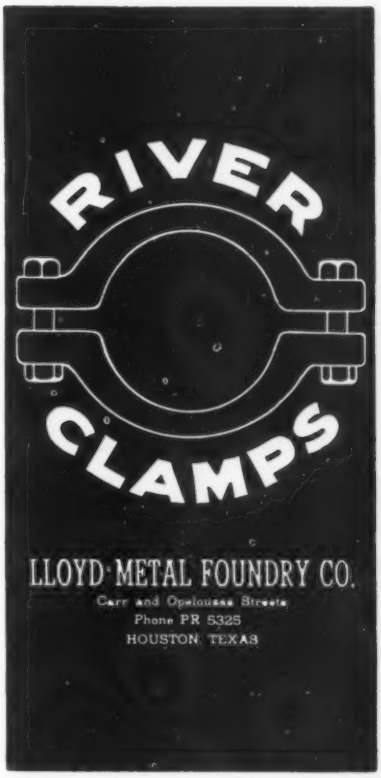
Recent drilling indicates large reserves throughout the Spraberry trend. Phillips holds 18,280 acres of leases in the area and commitments from a number of large leaseholders to run their crude production.

Feeder-Line O.K. Sought

WASHINGTON.—Mississippi River Fuel Corp., of St. Louis, is planning construction of a 98-mile, 18 and 16-in. natural-gas line from Woodlawn gas field in Harrison County, Texas, to the California Co. plant in Lincoln Parish, Louisiana.

The feeder line is part of new construction which will enable the company to tap two more gas sources, if the Federal Power Commission approves the project.

In addition to the Woodlawn line, Mississippi River would build an 11-mile, 10-in. lateral running south to



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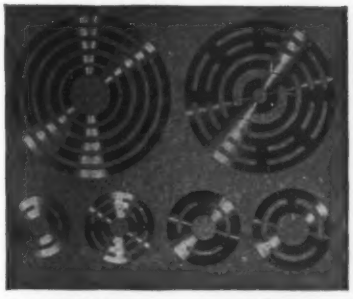

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Waskom field in Harrison County and lay a gathering system in Woodlawn field. Cost of the entire project is estimated at $5,624,217.

The company said gas from Woodlawn field would be obtained from Stanolind Oil & Gas Co. and Continental Oil Co. Ed E. Hurley and Byrd Oil Corp. would furnish gas from Waskom field. Quantities of gas to be transported through the lines during the 1951-52 heating season would average about 50,000,000 cu. ft. per day.

Ohio Fuel Plans New Lines

WASHINGTON. — Ohio Fuel Gas Co. plans to construct approximately 61 miles of natural-gas-transmission lines in northern and southwestern Ohio to meet increased demands on its system. The company's application is now before the Federal Power Commission for approval.

The proposed project includes about 16.5 miles of line in Erie County, 23.1 miles in Lorain County, 8 miles in Warren and Montgomery counties, and 13.7 miles in Madison County. If the project is approved, the company plans to retire about 37.3 miles of existing line. Estimated cost of construction is $2,690,000.

Ohio Fuel said that extension of service to new market areas is not involved, with all the proposed construction being required to meet increased demands in existing markets and to assist in transporting adequate supplies for future growth of those markets.

Products Tracers Tried

WASHINGTON. — Possibilities that important uses may be found for radioactive materials in the pipe-line industry have been pointed out by the Atomic Energy Commission in its semiannual report.

More than a score of industrial-research laboratories initiated radioisotope-factor programs during 1950 for oil and other industries.

One of the applications resulting from extensive laboratory and small-scale tests is the routine use of radioisotopes in an oil products pipe line to run from Salt Lake City to Pasco, Wash. The line is now in operation to Boise, Idaho, and when completed will cover a distance of 566 miles. A wide variety of products is pumped through the line, including several different types and grades of gasoline, diesel oil, and stove oil. Radioactive antimony is used to mark the boundary between various products.

Pipe-Line Briefs

Colorado Interstate Gas Co. has placed an order for 215 miles of 20-in. pipe for the company's new natural-gas line from Amarillo, Tex., to Kit Carson, Colo. Construction of the line is scheduled to begin this summer.

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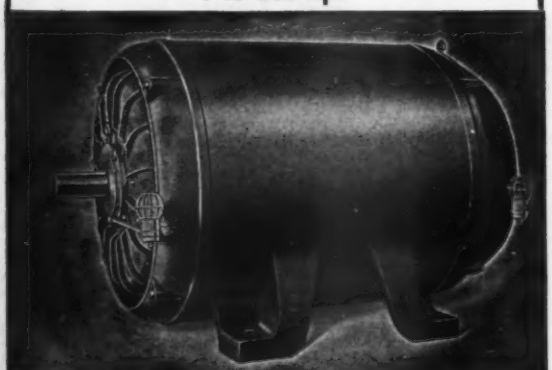

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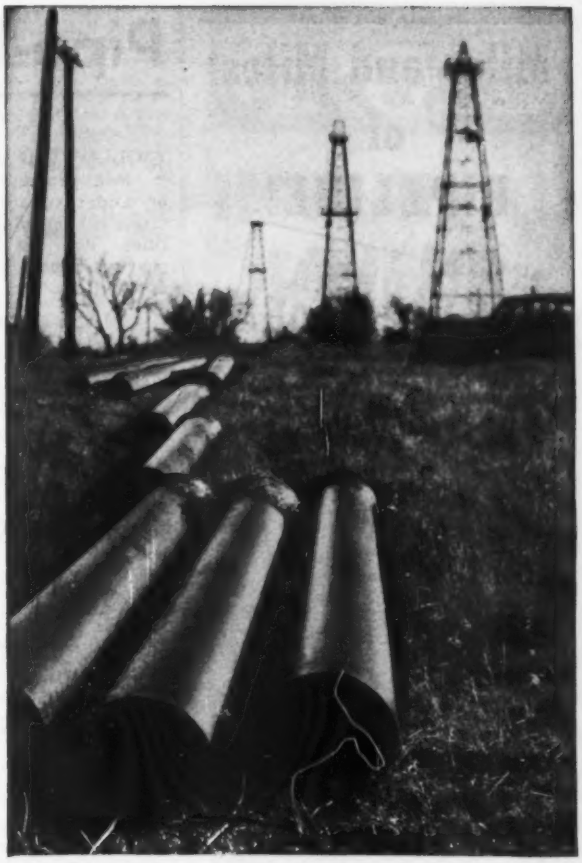

AN OLDTIME RECIPE FOR LONG-LIVED PIPE LINES

A recipe that waterworks and gas distribution engineers have used for over a century is: *specify cast iron pipe.* Refinery engineers have used it, too—with good success—for run-down, water and gasoline lines—for fire protection systems—salt water disposal—condenser and cooling coils.

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Alberta-Vancouver Oil Pipe Line Co. (Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

General Petroleum Corp.—42 miles, 8-in., under way, San Ardo to Estero Bay, Calif.; Bechtel Corp.; San Miguel, field office; J. S. Connell and George Anderson, superintendents.

Phillips Pipe Line Co.—35 miles, 10-in.; authorized; Brownfield, Tex., to Plains, Tex.

Phillips Petroleum Co.—278 miles, 10-in., under way, Borger, Tex., to Yale, Okla.; Brown-Lite Co., Tulsa, and Arey-Phillips Construction Co., Pampa, Tex., contractors.

Phillips Pipe Line Co.—53 miles, 8-6-in., under way, Wheeler to Sweeny, Tex.; O. R. Burden Construction Co.

Phillips Pipe Line Co.—34 miles, 8-in., under way, Thrall to Kansas City, Kans.; C. H. Gragg Construction Co.

Platte Pipe Line Co.—1,075 miles, 16-20-in., contracted, Worland, Wyo., to Wood River refining area in Illinois. Contracted as follows: 552 miles, Chatham, Wyo., to Holdredge, Neb., R. H. Fulton & Co., (Sections 1, 2, 3, and 4—section 1, 126 mi., of 16-in.—remainder 20-in.); 142 miles, 20-in., near Marysville, Kans., to Holdredge, Nebr., Bishop & Lock. H. LaQuey, spreadman, (Section 5); to begin May 1951; 100 miles 20-in., northern edge of Kansas, Rumsey Brothers, (Section 6); 274 miles, 20-in., State of Missouri, O. R. Burden, (Sections 7 and 8).

Progress Co.—900 miles, 20-in., proposed, Permian basin, West Texas to California.

Sinclair Pipe Line Co.—700 miles, 22-in., planned: Drumright, Okla., to Chicago.

Texas-New Mexico Pipe Line Co.—75 miles, 8-in., planned, Midland to Germania pool; Midland to Scarborough and Sweetie Peck area; and Crane station to McElroy area, West Texas.

Texas-New Mexico Pipe Line Co.—55 miles, 8-in., planned, Eunice to Covington and Saunders area, New Mexico.

Texas Pipe Line Co.—56 miles, 12¾-in., Chico to Wichita Falls, Tex.; R. H. Fulton & Co., contractor; M. L. Boyd, spreadman, Henrietta, Tex.

Trans-Mountain Oil Pipeline Co. (Sponsored by Bechtel Corp.)—715 miles, under way by July 1951, Edmonton, Alta., via Yellowhead Pass to Vancouver, B. C.

West Texas Gulf Pipe Line Co.—450 miles, 26-in., authorized, Colorado City to Wortham, Tex., 26-in.; Wortham to Sour Lake, Tex., 24-in.

West Texas Gulf Pipe Line Co.—18-in., authorized, Wortham to Longview, Tex.

Products Pipe Lines

Buckeye Pipe Line Co.—430 miles, 14-in., proposed, Linden, N. J., to Allentown, Pa., Junction; Chelsea, Pa., via Allentown Junction to Auburn, Rochester, Syracuse and Oswego, N. Y. Start 1952; finish 1953.

Great Lakes Pipe Line Co.—355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City Iowa, to Sioux Falls, S. D.

Great Lakes Pipe Line Co.—119 miles, 8-in.; planned; Des Moines to Iowa City.

Miami-Valley Corps.—58 miles, 8-in., under way, Dayton to Cincinnati, Ohio; Anderson Brothers Co.

Plantation Pipe Line Co.—707 miles, 14- and 18-in., contracted, Baton Rouge to Charlotte, N. C., 275 miles, 14-in., under way, Bremen to Charlotte, N. C.; 432 miles, 18-in., under way, Baton Rouge to Bremen, Ga.; 220 miles, 18-in., Baton Rouge to Mississippi-Alabama state line; Williams Brothers Co. David R. Williams, Jr., project manager, George Allen, spread superintendent, Tuscaloosa, Ala.; T. E. Davis, spread superintendent, Talledega, Ala.

Progress Co.—900 miles, 10-in., proposed, California to West Texas.

Pure Transportation Co.—100 miles, 6-in., under way, Heath to Dayton, Ohio; Wabash Construction Co.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Standard Oil Co. (Ind.).—50 miles, 8-in., under way, north of Sugar Creek, Mo., refinery; Lawhon Construction Co., Southern Mill & Mfg. Co., contractors.

Standard Oil Co. (Ind.).—144 miles, 8-in., authorized, Neodesha, Kans., to Sugar Creek, Mo.

Texas Pipe Line Co.—56 miles, 10 in., under way, Lawrenceville, Ill., to Mt. Vernon, Ind.; O. R. Burden Construction Corp., contractor; O. P. Hines, spreadman: Mt. Carmel, Ill., field office.

Triangle Pipe Line Co.—100 miles, 10-in., planned, Eldorado, Ark., to point on Mississippi River.

Tuscarora Oil Co., Ltd.—27 miles, 8-in., contracted, Pittsburgh Junction, Pa.; to Midland, Pa.; 34 miles, 10-in., contracted, Knappenberger Scraper Trap to Pittsburg Junction, Pa.; 26 miles, 10-in., contracted, Barneytown Scraper Trap to East Freedom, Pa.; Pipe line Construction & Drilling Co.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—276 miles, proposed, Greenwich, Conn., to Boston area; 492 miles, proposed, laterals-New England area.

Amere Gas Utilities Co.—15 miles, 8-in., authorized, KA-8 Flat Top to Beckley, W. Va. Completion date June 1951.

Amere Gas Utilities Co.—11 miles, 8-in., authorized KA-5 loop, Priceton and Athens, W. Va. Completion date December 1951.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.).—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Central Kentucky Natural Gas Co.—12 miles, 20-in., line E loop, Means to Foster, Ky. Completion date October 1951.

Central Kentucky Natural Gas Co.—15 miles, 20-in., Cold Spring, Ky., to Anderson's Ferry, Ohio. Completion date December 1951.

Cities of Booneville and Baldwin, Miss.—96 miles, ¾ and 6-in., under way, Booneville and Baldwin, Miss.; M. L. Hulcher Co., Inc., contractor, Sam Carnahan, spreadman. Completion date November 1, 1951.

Cities Service Gas Co.—40 miles, 4-10 in., Kansas, field office, Liberal; Pat Gilmore, spreadman; Knupp Construction Co., Inc., contractor.

Cities Service Gas Co.—56 miles, planned, Sedgwick, Harvey, and Labette counties, Kansas.

City of Alabama.—84 miles, 2 to 8-in., under way, Alabama; Modern Welding Co., Inc., contractor, D. D. Foreman, spreadman. Completion date October 1951.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned, Coast and Valley region, California.

Colorado Interstate Gas Co.—215 miles, 20-in., planned, Texas Panhandle to Colorado.

Commonwealth Natural Gas Corp.—69 miles, 12¾-in., under way, Petersburg, to Norfolk, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—14 miles, 8-in., under way, Suffolk to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—10

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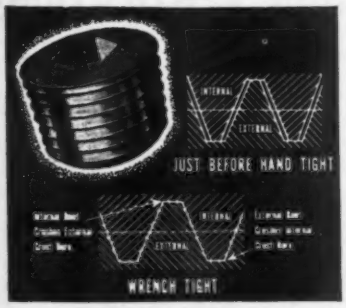

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miles, contracted, laterals—Richmond, Suffolk, and Portsmouth, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—99 miles, 18-in., under way, Stanardsville to near Petersburg, Va.; Ray L. Smith & Son, contractor, Don C. Smith, Orange, Va., spreadman.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Consolidated Gas Utilities Corp.—41 miles, 12-in., planned, Enid to Blackwell, Okla., Marlow to Cement, Okla.

Delhi Oil Co.—68 miles, 8-in., under way, Laredo to Lopeno, Tex. Altgelt Const. Co. contractor, Laredo, Tex., field office, Lee Phillips, spreadman. Completion date 4-1.

Dow Chemical Co.—12½ miles, 12-in., under way, vicinity of Bay City, Tex., to Sweeny Meter Sta.; Houston Contracting Co.; Bay City, Tex., field office; H. L. Leake and S. B. Harrison, superintendents.

East Tennessee Natural Gas Co.—172 miles, 22-in., proposed, Greenbrier to Oak Ridge, Tenn.

Egyptian Natural Gas Co.—80 miles, 6-8-in., authorized, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—122.9 miles, 30-in., proposed, looping along main line in Texas, New Mexico, Arizona.

El Paso Natural Gas Co.—470 miles, 24-in., under way, San Juan basin, New Mexico, to Franconia, Ariz.

Gulf Michigan Transmission Corp.—680 miles, 30-in., proposed, Perryville, La., across Arkansas, Missouri, and Illinois to terminus near St. John, Ind.

Hope Natural Gas Co.—32 miles, proposed, Fairmont to Terra Alta, W. Va.

Hugoton Production Co.—40 miles, 20 to 4-in., under way, near Ulysses, Kans., gathering system. Reese Bros. Const. Co., contractor, Hugoton, Kans., field office, Paul G. Reese, spreadman.

Humble Oil & Refining Co.—42 miles, 10-in., under way, Anahuac Gasoline Plant near Anahuac, Tex., to Gulf States Utilities plant near Beaumont, Tex.; Houston Contracting Co.; Winnie, Tex., field office; J. A. Cantrell, superintendent.

Kansas - Nebraska Natural Gas Co.—60 miles, 8-10-12-in., under way, Grand Island to Albion, Neb.; 40 miles, 6-in., under way, Albion to Norfolk, Neb.; 26 miles, 6-in., under way, Albion to Neligh, Neb. Jayhawk Const. Co., Inc., contractor, T. L. Hickerson, spreadman.

Kansas-Nebraska Natural Gas Co., Inc.—22 miles, 12-in., planned, Holcomb to Scott City, Kans.; 12 miles, 12-in., planned, Blakeeney to Palco, Kans.; 34 miles, 12-in., planned, Palco to Phillipsburg, Kans.; 10 miles, 12-in., planned, Alma to Holdredge, Neb. (replacement lines). Neb., 39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in., planned, Neligh to Hartington, Neb. (extension).

Manufacturers Light & Heat Co.—172 miles, 16-20-24-in., proposed, Clinton County, Pennsylvania, to vicinity of Pittsburgh, Pa.

Manufacturers Light & Heat Co.—50 miles, contracted, near Pittsburgh, Pa.; 75 miles, near Bradford, Pa.; Britton Contracting Co., contractor.

Michigan Consolidated Gas Co.—180 miles, 24-in., planned, Austin, Mich., to Detroit.

Mid-South Gas Co.—40 miles, 12-in. Helena to Forrest City, Ark.; Tulsa Construction Co., contractor; Frank McCoy, spreadman; field office, Marianna, Ark.

Mississippi River Fuel Corp.—98 miles, 16 and 18-in., proposed, feeder line from Lincoln Parish, La., to Waskom field, Harrison County, Texas.

Mississippi River Fuel Corp.—40 miles 18-in., authorized, Dubach to Perryville, La

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgin; 5 miles from Hillsdale to Jonesville and 6 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned.

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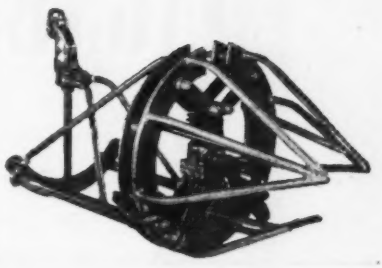
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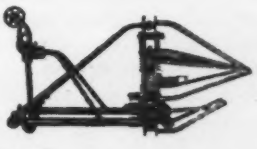
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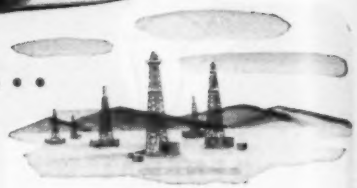

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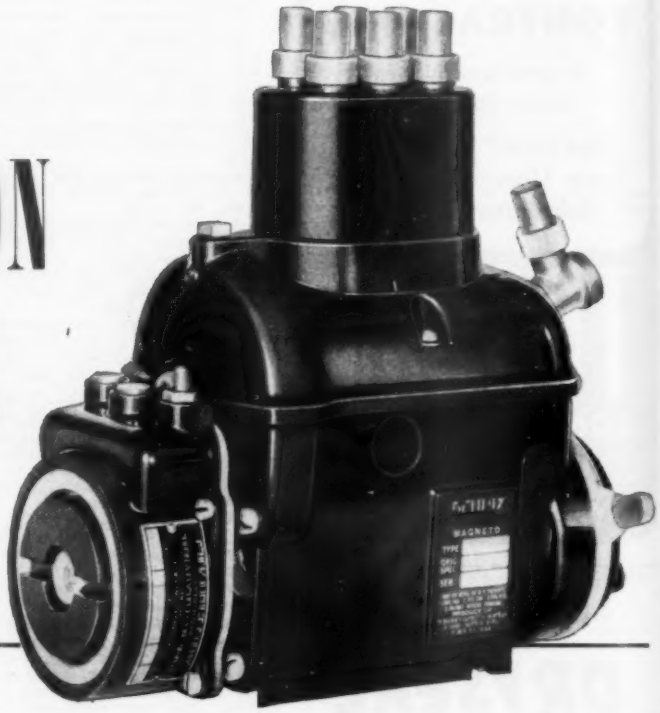

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Summers or Monroe counties, W. Va., to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—39 miles, 20-in., proposed, Potter County, Pennsylvania, to Livingston and Monroe counties, New York.

New York State Natural Gas Corp.—26 miles, 20-in., authorized, New Kensington to South Bend, Pa.

New York State Natural Gas Corp.—51 miles, 20-in., authorized, New Kensington, Pa., to Ohio line.

New York State Natural Gas Corp.—27 miles, 16-in. authorized, looping in Greene and Westmoreland counties.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

New York State Natural Gas Corp.—62 miles, 20-in., under way, Murrysville, Pa., to Petersburg, Ohio; 37 miles, 20-in., under way by May, Boome storage field to Ithaca, N. Y. Field office, Lawrenceville, Pa. Completion date October 1951; 23 miles, 20-in., contracted, state line station to Angelica, N. Y. Office, Wellsville, N. Y. Completion date October 1951: 82½ miles, 20-in., under way by May, Utica to Ithaca, N. Y. Field office, Clinton, N. Y., Leman Creech, supt.; 85 miles, 16-in., under way by September, Utica to Albany, N. Y.; Williams-Austin Co., contractor, Ed Peters, over-all general supt.

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way by April 1, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—511 miles 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—370 miles, 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in. authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Ohio Fuel Gas Co.—61 miles, proposed, northern and southwestern Ohio.

Oklahoma Natural Gas Co.—40 miles, 16-in., Velma to Chickasha, Okla.; Trojan Construction Co., contractor.

Oklahoma Natural Gas Co.—53 miles, 26-in., under way, Edmond to Depew, Okla.; Trojan Construction Co., contractor; "Swede" Tillotson, spreadman; Stroud, Okla., field office.

Oklahoma Natural Gas Co.—40 miles, 16-in., planned, Ninnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Pacific Gas & Electric Co.—47 miles, 8-in., authorized, Salina to Kilfg City, Calif.

Pacific Gas and Electric Co.—141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Gas Pipe Line Corp.—2,175 miles, planned, Wharton County, Texas, via Oklahoma, Kansas, Fort Collins, Colo., to Portland, Ore., Tacoma and Seattle, Wash.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola Ill., eastward—looping present system; R. A Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Phillips Petroleum Co.—118 miles, 3-22-in. under way, Sherman and Hansford counties, Texas gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas Tex.

Piedmont Natural Gas Co.—28 miles, 6-in., proposed, North Carolina—laterals from Transcontinental gas system.

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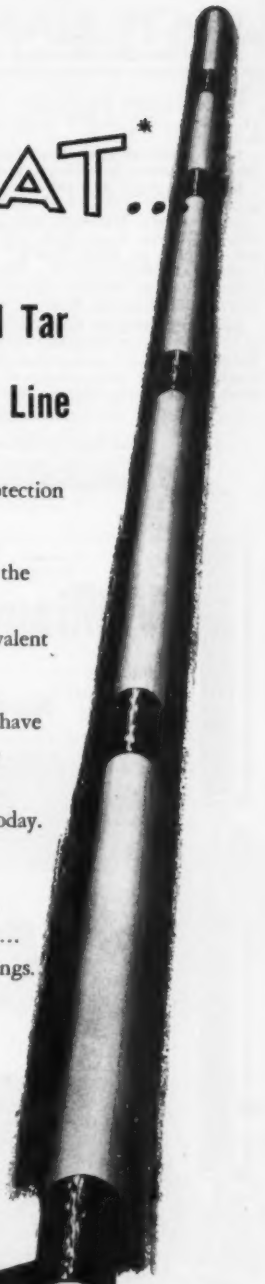

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Potomac Gas Co.—18 miles, 16-in., Dranesville to Arlington, Va.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

South Atlantic Pipe Lines, Inc.—254 miles, proposed, Jacksonville area to St. Petersburg, Fla.

South Central Alabama Natural Gas Co., Inc.—150 miles, proposed, central Alabama.

South Georgia Natural Gas Co.—248 miles, planned.

Southeastern Michigan Gas Co.—55 miles, 12¾-in.; under way; from point near Clawson, Mich., to Port Huron, Mich.; H. L. Gentry Construction Co., contractor; field office, Utica, Mich.; spreadman, Frank Morris. Completion date 5-1-51.

Southern Natural Gas Co.—120 miles, 16-in.; under way; Mitchell Village, Ala., to Bolingbroke, Ga.; Associated Pipe Line Contractors, Inc., contractor; Columbus, Ga., field office; Lacy Walker, spreadman.

Southern Natural Gas Co.—138 miles, 20 22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta Ga.

Sunray Oil Corp.—133 miles, 3-30-in., system for Snyder gasoline plant, Vaughn & Taylor Construction Co., contractor. D. D Vaughn, spreadman.

Tennessee Gas Transmission Co.—992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

Tennessee Gas Transmission Co.—438 miles, planned, looping on Buffalo and New England extensions.

Tennessee Gas Transmission Co. and Northeastern Gas Transmission Co.—175 miles, 24-in., under way, Albany, N. Y., near Wilmington (Boston area), Mass. Oklahoma Contracting Co., contractor, Springfield, Mass., headquarters, Paul R. Halbert, manager, H. A. Wylie, spreadman at Pittsfield, Mass., Aldress Kilgore, spreadman at Westfield, Mass. L. B. Rea, spreadman.

Tennessee Gas Transmission Co.—304 miles, 24-in., proposed, between Mercer, Pa., and Utica, N. Y.; 528 miles, proposed, loops; 200 miles, proposed, miscellaneous lateral lines.

Tennessee Gas Transmission Co.—158 miles, 30-in., under way, vicinity of Jones, La., on the north to near Cypress, Tex., on the south; Houston Contracting Co. Four spreads located as follows: North end work at Bastrop, Tex., W. H. Hayes and M. L. Thompson, superintendents; center section at Natchitoches, La., E. C. Norris and R. E. Thornton, superintendents; south end at Conroe, Tex., F. A. Silar, superintendent.

Tennessee Gas Transmission Co.—64 miles, 26 and 30-in., loops, contracted, South Texas. Oklahoma Contracting Co., contractor, field office, Falfurrias, Tex., Panama Shiflett, superintendent.

The Texas Co.—16 miles, 2-6-10-in., under way, gathering system at Davenport, Okla.; C. P. Carter Construction Co., contractor. Office Prague, Loyal Bowman, spreadman.

Texas Eastern Transmission Corp.—169 miles, 30-in., contracted, extending northeast from Kosciusko, Miss., Williams Brothers-Davis Co., contractor.

Texas Eastern Transmission Corp.—791 miles, 30-in., planned, Koscuisko, Miss., to Connellsville, Pa.

Texas Eastern Transmission Corp.—35 miles, 30-in., contracted, Connellsville to Delmont, Pa.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—189 miles, 26-in., proposed, Acadia Parish to connection with existing facilities in Morehouse Parish.

Texas Gas Transmission Corp.—195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—372 miles, 26-in., proposed, looping from Bastrop, La., to Hardinsburg, Ky.

Texas Gas Transmission Corp.—580 miles, 26-in., proposed, Louisiana and Kentucky.

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christi area to Joliet, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11 M. T. Wilhite, superintendent; field office Du Quoin, Ill.

Texas-Illinois Natural Gas Pipeline Co.—117 miles, 30-in., Effingham to Sibley, Ill., Midwestern Constructors, Inc., contractor of Schedule 12.

Texas-Illinois Natural Gas Pipeline Co.—92 miles, 30-in., Sibley to Joliet, Ill.; Midwestern Constructors, Inc., contractor of Schedule 13.

Texas-Illinois Gas Pipe Line Corp.—489 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. A. M. Berlander, general superintendent; field offices at Newport, Ark., J. E. Richardson; Texarkana Ark., V. L. Williams; Popular Bluff, Mo. A. M. Berlander.

Texas-Illinois Gas Pipe Line Corp.—200 miles, 30-in., contracted; Trinity River to Texarkana; H. C. Price, contractor. Work under way.

Transcontinental Gas Pipe Line Corp.—35 miles, 24-in., authorized, Paterson lateral to Greenwich, Conn.

Trunkline Gas Co.—1,775 miles, 10 26-in., under way, includes 740-mile, 26-in. Lake Charles, La., to Tuscola Station of Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in., Lake Charles, La., to McAllen, Tex., completion due October 1, 1952.

Trunkline Gas Co.—50 miles, 26-in., contracted, Longville to northeast vicinity of Hineston, La.; 126 miles, 26-in., contracted Epps to Hineston, La.; 42 miles, 16-20-in., under way, Lake Arthur, Longville to point north of Iowa, La., (Section 1, lateral line); 33 miles, 20-in., under way, Lake Arthur, La., to Lacassine, La.; Houston Contracting Co., contractor.

Trunkline Gas Co.—176 miles, 26-in., under way, Darnell, La., to Longville.

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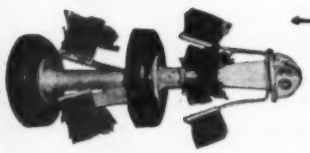

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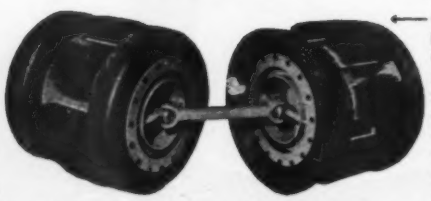
20" Size—TYPE GP-2—16" to 30". 200-LB. SPRING Forces the Brushes against pipe wall —COMPENSATING for WEAR. Will traverse round-opening gate or plug valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP PIGS.



24" Size — GP-3 — 18" to 30" Sizes will pass 1½R-90° Bends. SPRINGS COMPENSATE for BRUSH WEAR, ASSURING Full section cleaning efficiency. GP-3 consists of two Type GP-1 Pigs. — Each Unit may be used as individual pig.

*Patents Pending. P. O. Box 4038

T. D. Williamson, Inc.

TULSA 9, OKLAHOMA

La.; Houston Contracting Co., contractor of Section A, main line. E. C. Norris, Olla, La., spreadman. W. H. Hayes, spreadman, De Ridder, La.

Trunkline Gas Co.—180 miles, 26-in., contracted, Darnell, La., to Senatobia, Miss.; Anderson Bros. Corp., contractor, Section B, main line.

Trunkline Gas Co.—184 miles, 26-in., under way, Senatobia, Miss., to Paducah, Ky.; R. H. Fulton & Co., contractor of Section C, main line. Clark Williams, Memphis, Tenn., spreadman.

Trunkline Gas Co.—186 miles, 26-in., contracted, Joppa to Tuscola, Ill.; Mahoney Contracting Co., contractor of Section D, main line.

Trunkline Gas Co.—262 miles, 20-in., contracted, McAllen to Altair, Tex.; R. H. Fulton & Co., contractor of Section E and F, lateral lines.

Trunkline Gas Co.—217 miles, 24-in., contracted, Longville, La., to Altair, Tex.; Anderson Bros. Corp., contractor of Sections G and H, lateral line.

United Gas Pipe Line Co.—50 miles, proposed, southeastern Alabama and northwestern Florida.

United Gas Pipe Line Co.—93 miles, 6 to 16-in., authorized, fields in Plaquemines Parish to near New Orleans.

United Gas Pipe Line Co.—54 miles, 20-in., under way, Needville to Freeport, Tex.; Texas Louisiana Contractors; Angleton and Rosenberg, field offices; Jim Reed and Red Latam, spreadmen. Completion date, May 1.

United Gas Pipe Line Corp.—510 miles, 24-26-30-in., contracted, Agua Dulce, Tex., to Monroe, La.; 233 miles, 20-24-26-30-in., from Pure Oil Co.'s offshore platform Block 32 Eugene Island area to Jackson, Miss., comp. sta.; 42 miles, 24-in., from Verna comp. sta., Miss., to Baxterville, Miss., dehydration plant; 52 miles, 20-24-26-in., Lirette to Napoleonville, La. to tie into Eugene Island-Jackson, Miss. 30-in. line mentioned above; 60 miles, 12-16-20-in., from Lafayette comp. sta. and Weeks Island field to Franklin, La., to connect with above mentioned 30-in.; 59 miles, 30-in., Jackson comp. sta., Miss., to Texas Eastern Trans. Corp. proposed 30-in. line near Kosciusko, Miss.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted by Gulf Southern Contractors, a joint venture including Texas Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott and Morrison-Knudson. Inspection by Brown & Root, Inc.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake Utah.

Valley Gas Pipe Line Co., Inc.—500 miles, 24-in., proposed, Berclair, Goliad County, to northeast Saratoga, Hardin County, Texas, to Vermilion Bay area of Louisiana.

Valley Gas Pipe Line Co., Inc.—1,000 miles, 30-in., proposed, Saratoga northeast to Arcadia, La., to El Dorado and Jonesboro, Ark., Cape Girardeau, Mo., Lawrenceville, Ill., Terre Haute, Ind., and Atlanta, Ind., thence to northeast terminal point in southern Michigan.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—1,408 miles, 30-in., planned, northern Alberta to Vancouver, B. C., and northern California.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned. Southern Alberta to Duluth, Minn.

York Gas Co. and Corning Glass Co.—30 miles, York, Pa., and Corning, N. Y.; Britton Contracting.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta Pacific Oil Pipe Line Co. (Brokaw, Dixon, McKee).—970 miles, 16-in. proposed, Edmonton south to Kingsgate, B. C., to Washington to Vancouver, B. C.

Basrah Petroleum Co.—72 miles, 12-16-in., under way, Zubair to Fao, Iraq.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

Middle East Pipelines, Ltd.—800 miles, 34-36-in., planned, Iran to a Levantine port.

Montreal Pipe Line Co., Ltd.—68 miles, 18-in., under way, near Highwater, Que., to Montreal East; Fred Mannix & Co., B. V. Elliott, superintendent, Cowansville, Que. (Section 3).

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Shell Caribbean Petroleum Co.—11 miles, 16-in., authorized; Bachaquero (north) to Lagunillas, Venezuela, 5-51.

Shell Caribbean Petroleum Co.—165 miles, 30-in., under way; Palmarejo to terminals on the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 12-51. Land sections contracted by Williams Brothers, de Venezuela, S. A., Charles P. Williams, manager, Marvin E. Jones, superintendent. Water crossings contracted by Mahoney Contracting Co.

Shell Caribbean Petroleum Co.—18 miles, 4-in., under way, Mara to Palamarejo.

Shell Caribbean Petroleum Co.—16 miles, 14-in., under way, Tia Juana to Cabimas (hot oil).

Trans-Mountain Oil Pipe Line Co.—715 miles, proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., contractor. Completion date 1952.

Winnipeg Pipe Line Co., Ltd.—75 miles, 10-in., under way, Gretna to Winnipeg, Manitoba; Sparling-Fowler Co., Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Cia. des Pipe Lines Petroliers Francias.—150 miles, 10-in., planned, Le Havre to Paris, France.

Colombia Ministry of Petroleum.—90 miles, 6-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—180 miles, 4-in., planned, Puerto Berrio to Medellin, Colombia.

Colombian Ministry of Petroleum.—75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Estrada de Ferro Santos Jundiai.—32 miles, 16-in., under way, Santos to Sao Paulo Brazil; Techint, contractor.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S. A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Petroleos Mexicanos.—155 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar, to Bogota, Colombia; Williams Brothers Corp., David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—400 miles, proposed, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

Foreign Natural-Gas Pipe Lines—Planned and Under Way

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., planned, Cortemaggiore to Genoa.

Azienda Generale Italiana Petroli.—110 miles, planned, Cortemaggiore to Bologna.

Azienda General Italiana Petroli.—145 miles, 14-16-in., under way, Cortemaggiore to Torino. Completion date 1951.

Azienda Generale Italiana Petroli.—30 miles, 8-in., under way, Ferrara to Bologna. Completion date, July 1951.

Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

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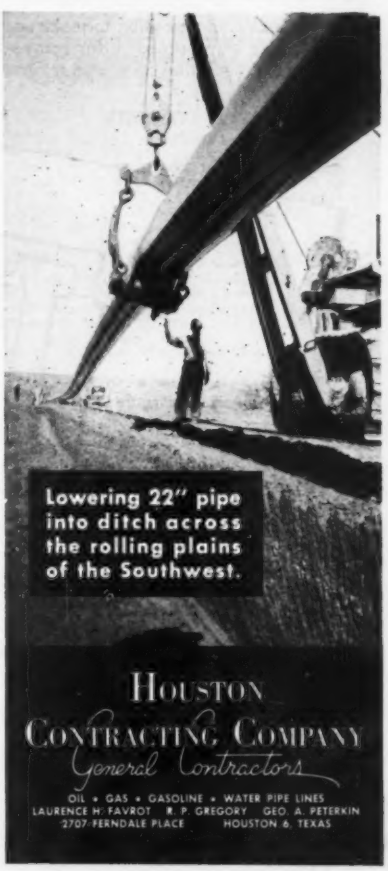
Lowering 22" pipe into ditch across the rolling plains of the Southwest.
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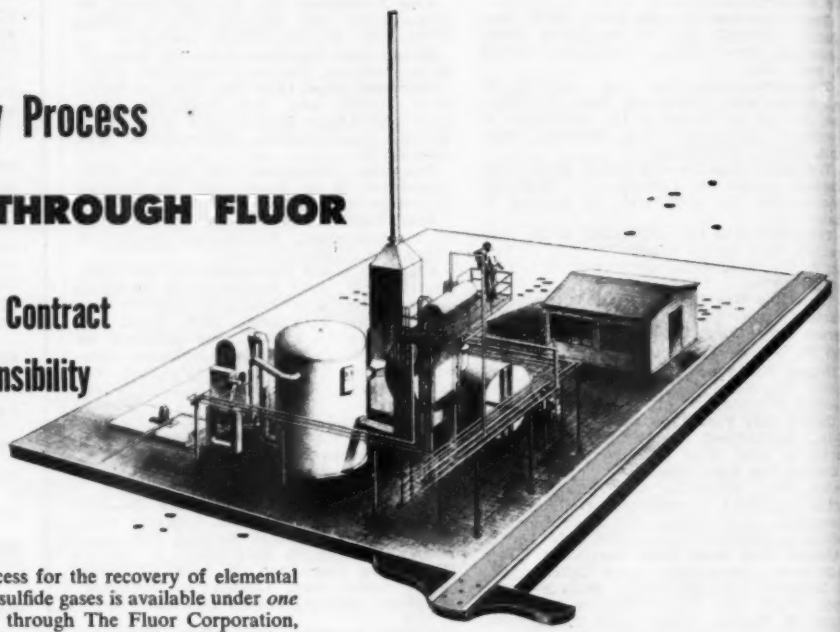
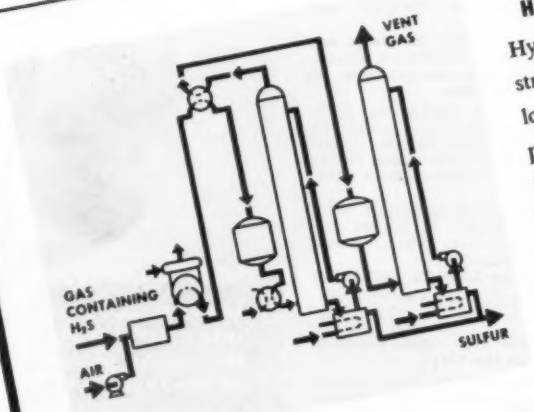


The proven Mathieson Process for the recovery of elemental sulfur from waste hydrogen sulfide gases is available under *one* contract, *one* responsibility through The Fluor Corporation, Ltd. With over 30 years' experience in the design, engineering, and construction of plants and facilities for the petroleum and chemical industries, Fluor possesses the background, the skilled personnel, and the know-how essential for the practical interpretation of the Mathieson Process into *your particular* sulfur recovery program.

Fluor is in a position to make economic studies covering every phase of proposed sulfur recovery installations—initial investment, operating costs, and returns to the investor.

A Simple Process for the Conversion of Waste Hydrogen Sulfide to Pure Elemental Sulfur



Hydrogen sulfide, recovered from a sour gas stream, is partially burned with air—cooling follows with steam generated being utilized for power. Combustion gases are then passed through a catalyst tower to form sulfur and water vapor. Elemental sulfur product is condensed in a wash tower by direct contact with cooled liquid sulfur. The result is pure commercial sulfur—ready for sale or for conversion into sulfuric acid.

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REFINING

Esso Expansion

Capacity increase planned for Everett, Mass., plant

NEW YORK.—Plans for a major expansion and modernization of the Everett, Mass., refinery of Esso Standard Oil Co. under which capacity will be increased by 6,000 to 38,500 bbl. daily were announced by the company this week.

Facilities scheduled for construction include an 18,500-bbl. per day fluid catalytic cracking unit, a 7,000-bbl. per day rerun pipe still, fractionator, gas-compression plant, and improved light-ends facilities. The installations are expected to be completed early in 1953.

In addition to increasing yields of gasoline and heating oils from present crude capacity, the new facilities will make the plant self-sufficient in the production of quality gasoline. Heretofore, the Everett refinery has had to bring in components from other plants for the manufacture of high-grade gasoline. Esso said gasoline and heating-oil output would be increased about 9,500 bbl. daily.

Current production. — The Everett plant, originally constructed in 1919, is located on the outskirts of Boston. Current production from 32,500 bbl. daily charge is 25 per cent motor fuel, 10 per cent refined oil, 35 per cent heating and diesel oil and residual fuel, and 30 per cent asphalt. Because of existing facilities and equipment, only 4,000 tons of steel will be required for the project compared with 30,000 tons needed to build equivalent new refinery capacity.

Stanley C. Hope, Esso president, said that the Everett program, in addition to increasing civilian supplies, will also provide a potential daily production of 84,000 gal. of high-octane aviation gasoline, or alternatively, raw materials for synthetic rubber should the mobilization needs of the country require it.

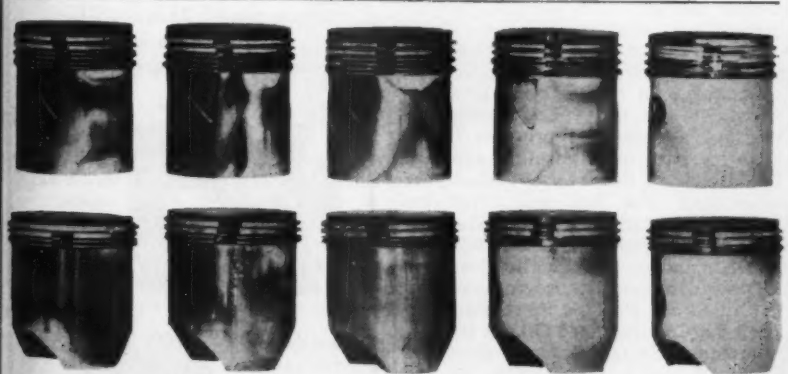
Greater diversity. — Though designed principally to improve efficiency in plant operation, the Everett project affords greater diversification of the company's facilities in accordance with defense recommendations, Hope said. Esso's postwar program of almost continuous expansion, modernization, and improvement of manufacturing facilities, latest development being the Everett project, has resulted in an increase in products-production capacity of nearly 100,000 bbl. daily, he added.

Process engineering work at Everett will be handled by Standard Oil Development Co. Contracts for construction have not yet been let.

Pan Am Increasing Capacity

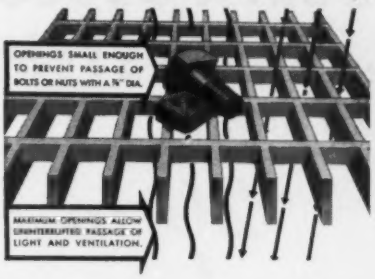
TEXAS CITY, Tex.—Pan American Petroleum & Transport Co. has announced preliminary plans to increase capacity of its refinery here, with most of the new construction going to boost the company's aviation-gasoline production.

The expansion will include construction of a fluid catalytic cracking unit and polymerization plant and is expected to increase the refinery's



***MOTOR-OIL ADDITIVES.**—Effect of detergent content on cleanliness of pistons is illustrated here. Pistons in the top row are from a vehicle that was in heavy-duty service. Those in the bottom row were in door-to-door delivery service. In each case, the piston at the extreme left represents operation with regular-grade oil. Moving to the right, the successively cleaner pistons represent operation with increasing detergent content. Piston on the extreme right in each row is from engine which was run on Series 2 type of oil containing much higher percentages of detergent than 2-104B oils. The above illustration was shown incorrectly in the article, "Motor-Oil Additives," by J. C. Geniesse and W. Schreiber which appeared in The Oil and Gas Journal of March 29, 1951, p. 302.*

TRI-LOK RECTANGULAR OPEN STEEL FLOORING


OPENINGS SMALL ENOUGH TO PREVENT PASSAGE OF BOLTS OR NUTS WITH A ½" DIA.
MAXIMUM OPENINGS ALLOW UNINTERRUPTED PASSAGE OF LIGHT AND VENTILATION.

Tri-Lok strength is obtained by truss action through twisted cross-bar, curved in opposite directions at each bearing-bar. Standard openings in Tri-Lok Rectangular Steel Flooring are 1" x 3⅞"—other sizes can be supplied as required.

Diagonal, or Super-Safety U-type Flooring, and stair treads of all types, are available. Bulletin MN1140 describes the construction features of Tri-Lok Open Steel Flooring.

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present crude-run capacity of 115,000 bbl. by about 10 per cent.

The company has not yet applied for a certificate of necessity for construction, pending completion of engineering work now in progress. Further details on construction will be announced in about a month when this work is completed. The new facilities are scheduled tentatively to be placed in operation by the end of 1952.

Sinclair Terminal Opened

JACKSONVILLE, Fla.—Sinclair Refining Co. last week formally opened a new, modern deep-water products terminal here.

The terminal is located on a 20-acre tract on the St. John's River channel and has six storage tanks with a combined capacity of approximately 330,000 bbl. Products will be supplied from Sinclair's plants at Marcus Hook, Pa., Corpus Christi, and Houston.

Each tank is equipped with a remote-control, 600-g.p.m. electric pump. The terminal has facilities for loading eight tank cars and two transport trucks per hour. The dock provides a minimum of 35 ft. of water at mean low tide, thus allowing ocean-going tankers to arrive or depart any time.

At the formal opening, P. C. Spencer, Sinclair president, said the terminal will cost more than $1,000,000 before all work is completed. He said its construction was decided on as the first step in an over-all Sinclair program aimed at greater participation in the Jacksonville area market.

Big Avgas Contract Signed

SAN FRANCISCO.—Standard Oil Co. of California has signed a $25,000,000 contract to supply United Air Lines with aviation gasoline over a 3-year period. It is said to be the largest ever negotiated by an airline.

The contract is for gasoline only and becomes effective January 1, 1952. Gasoline thus contracted will cover about 46 per cent of United's fuel needs. The contract represents 75 per cent increase over gasoline supplied by Standard under the last 3-year agreement. The fuel will cover the airline's operations from Salt Lake City to the West Coast, California to Hawaii, and on the Pacific Coast.

Other companies supplying gasoline to United are Phillips Petroleum Co., Shell Oil Co., Standard Oil Co. (Ohio), Esso Standard Oil Co., and Gulf Oil Corp.

Refining Briefs

Shamrock Oil & Refining Co., which recently purchased Louis Rose Refining Co. facilities at Saginaw, Mich., is now revamping the plant preparatory to placing it in operation. Facilities include a 3,500-bbl. combination unit.

Whether your cooling tower is new or old—natural or induced draft—let a qualified Fluor Service Representative study your maintenance and repair problems—at no cost to you!

2 FREE SERVICES AVAILABLE

1 PREVENTATIVE MAINTENANCE — Fluor will recommend a preventative maintenance program based on operating conditions and locale—and then arrange for periodic inspections!

2 ESTIMATES FOR REPAIR—Fluor will inspect to determine repairs necessary to bring your tower back to original design efficiency—then bid for the job competitively!

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Catalog 250 Describes
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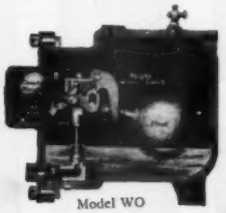
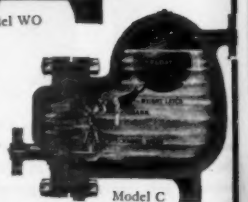
for
Separators, Accumulators, After-Absorbers, Heaters, and Compressors



Top trap for press. to 650 lbs.; bottom, to 1500.

Model WO

Both types widely used for discharging gasoline, water and oil.



Model C

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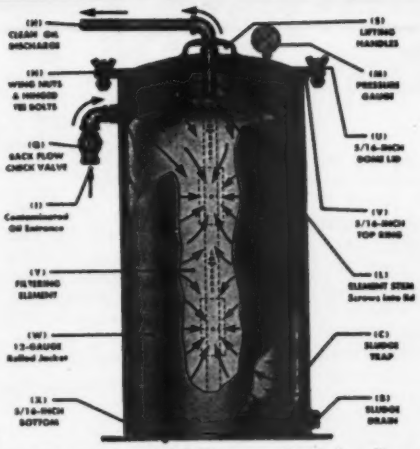

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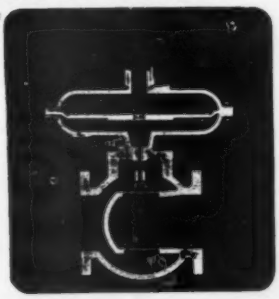

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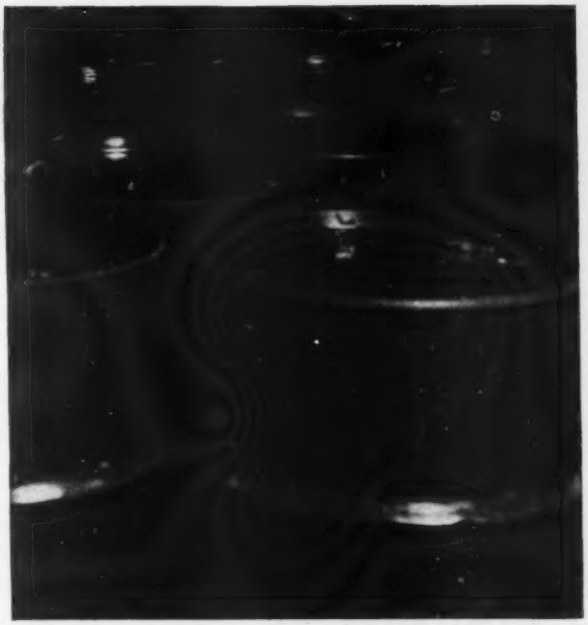

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TOOL COMPANY DIVISION
H. K. PORTER COMPANY, INC.
Tulsa 1, Oklahoma

Among the Drilling Contractors

Number of Active Rigs Sets Record This Year

More rotary rigs were operating in the United States and western Canada during the week ended April 9 than at any time since the latter part of December. Operating rigs that week (latest report) totaled 2,409, an increase of 77 over the previous week. The last time this number was exceeded was during the week ended December 25 when 2,480 rigs were reported running. It was only two weeks before that the number of active rigs climbed to an all-time "high" of 2,521. The number of active rigs during the week of April 9 was 308 more than during the corresponding period a year ago.

An increase of 30 in the number of rigs operating in West Texas and New Mexico boosted the total in that area to 832, a new all-time record. A substantial increase in drilling activity also was reflected in the Rocky Mountain region where 125 rigs were reported running as compared with 108 the previous week. Distribution of active rigs by areas during the week is shown in accompanying table.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

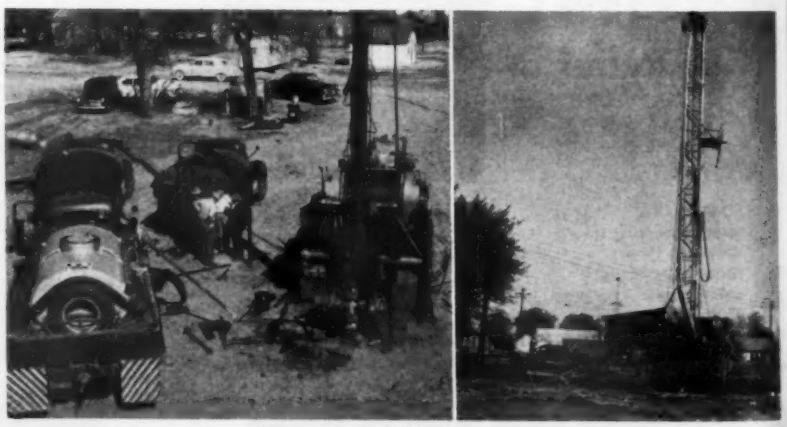
Area—	Week ended 4-9-51	Change week ended 4-2-51	Change week ended 4-10-50
Gulf Coast	524	0	+ 10
W. Tex.-N. M.	832	+30	+104
Ark.-N. La.-E. Tex.	138	— 2	+ 16
Oklahoma	300	+ 7	+ 44
Kansas-S. Nebraska	157	+ 6	+ 28
Illinois-Eastern	83	+ 8	— 11
Rocky Mountains	125	+17	+ 59
Pacific Coast	146	+ 6	+ 18
Total U. S.	2,305	+72	+268
Western Canada	104	+ 5	+ 40
Total	2,409	+77	+308

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States as a whole and the Rocky Mountain and western Canada areas are shown by charts on pages 290 and 291.

Chance Drilling Co., Houston, is drilling a projected 9,700-ft. wildcat test 4 miles south of Beaumont, Jefferson County, Texas Gulf Coast, for John W. Mecom. Location of the test, 1 McFaddin Trust, is in Section 1, T&NO Survey.

Summit Drilling Corp., Tulsa, has a contract for a Wilcox sand test to be drilled for Deep Rock Oil Corp. at 1 Somnes, SW SW NE 28-21n-1w, ¾ mile southwest of Perry, Noble County, Oklahoma. The location is on the flank of an old, shallow gas area. Wilcox is expected around 5,300 ft.

Taylor Drilling Co., Lewistown, Mont., has been awarded a contract for the deep test which the Sohio Petroleum Co. of Canada group of



Activity in the new Lindsay Townsite pool, Garvin County, Oklahoma, where Parker Drilling Co., Tulsa, and Rollin Drilling Co., Oklahoma City, have a rig each working for Max Pray and Kenneth A. Ellison, operators in the pool. In the scene at the left, a newly drilled well on the east side of the Lindsay townsite is being acidized for completion. The rotary rig, which drilled the well, now is on another townsite location, and the well is being completed with a small cable tool unit. Picture at right shows Parker's rig in foreground and Rollin's rig faintly visible in background. Production in the pool is from a Deese sand at approximately 7,900 ft. Three wells have been completed in the pool, opened last January.

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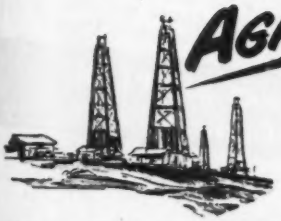

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companies will drill 14 miles from Watrous in central Saskatchewan Province, western Canada. A new, 8,000-ft. capacity rig is being moved to the location. Taylor currently has three rigs running in Montana, one for Bill Robson in Fergus County, another for Amerada Petroleum Corp. in Wheatland County, and the third for its own account on the Mosby Dome in Garfield County.

Mabee Drilling Co. is the contractor on a semi-wildcat test which Fordee Rhoades Oil Co. is drilling in the SW NE NE 9-9n-4e, west of the north end of the West Earlsboro pool in Pottawatomie County, Oklahoma.

Jack Grace Drilling Co., Wichita Falls, Tex., has a contract for a projected 7,500-ft. test which Hunt Oil Co. is starting in western Foard County, northern Texas. Location for the test, 1 Johnson, is in Section 11, Block A, SPRR Survey, about 12 miles northeast of the Johnson field.

Tolar Drilling Co. has the rotary drilling contract for a wildcat test which T. N. Tennant and George Aubrey of Evansville, Ind., are planning to drill soon in Gibson County, Indiana. Definite location for the test has not been announced.

Southern Production Co., Inc., Shreveport, has taken on a drilling contract with Lion Oil Co. for a 15,000-ft. test located about 4 miles east of Goshen Springs, Rankin County, Mississippi. Location for the test, 2 Denkman, in the C NW NE 22-7n-4e, is about ¼ mile from another deep test (1 Denkman) drilled by the same operators. The first hole was junked at 13,186 ft. Smackover lime is the objective.

Claud M. Bagley, Shreveport, has a rig working for Weaver & Johnson Co. on a wildcat test in the Eagle Mills area, 3 miles west of Nashville, Hempstead County, Arkansas. Location is on the Byers lease in the C NW NE 29-9s-26w.

Reserve Drilling Co., Inc., Wichita, is drilling for Nadel & Gussman at 1 Lipprand, in the NW NW SE 2-15-13, a wildcat location a mile south of the Hall-Gurney pool, southern Russell County, Kansas.

Davis & Wharton Drilling Co., Oklahoma City, is working on the second of three directional wells which C. E. McCaughey has projected for the new Cushing Lake pool, near Cushing, in Payne County, Oklahoma. The wells are being drilled to locations under Cushing Lake, the water supply for the city of Cushing. The first of the three projected wells has just been completed as the first confirmation producer of the pool. Rig was skidded 24 ft. for McCaughey's second well. Production is at 4,150 ft.

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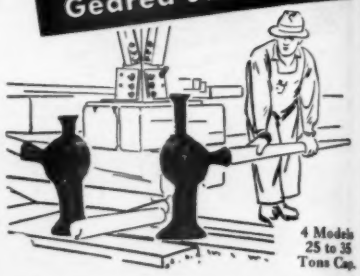

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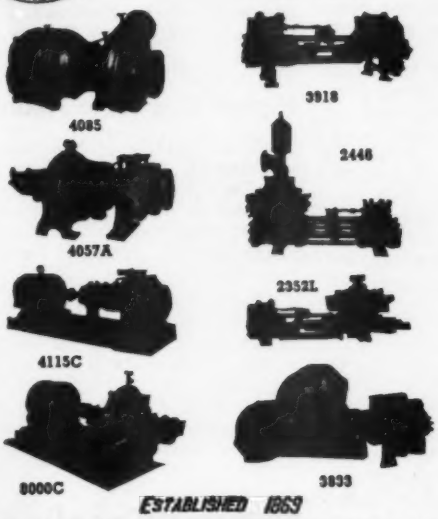

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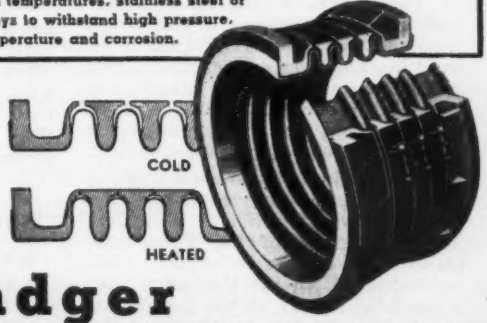

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NATURAL GAS

S.G.A. Conclave

Study of mobilization problems scheduled

BILOXI, Miss.—More than 1,500 delegates from 14 states are expected to attend the forty-third annual convention of the Southern Gas Association here April 23-25.

Manpower problems that gas industry must face as the country's armed forces and defense plants expand will come in for a large share of attention through the program which is keyed primarily to the mobilization situation.

Addresses.—D. A. Hulcy, president of the American Gas Association, will sound the keynote in his address, "A United Gas Industry Speaks." Defense measures for gas-distribution systems will be outlined by Fred W. Amadon, Jr., defense coordinator for Washington (D.C.) Gas Light Co. Dr. Watrous H. Irons, vice president of the Federal Reserve Bank of Dallas, is scheduled to address a general session on "Business in a Defense Economy."

Government regulations affecting the industry will be examined from several angles with Scott Hughes, vice president of Southern Union Gas Co., Dallas, and Fred D. Bradley, also of Southern Union, addressing the accounting and distribution sections respectively. Security measures to be taken as a part of the defense program are also on the agenda to be discussed by executives on the distribution side of the industry.

Delegates from Kentucky, fourteenth state to join S.G.A., will attend the convention for the first time this year.

Gas Lines for Los Angeles

LOS ANGELES.—Southern California Gas Co. last week announced it will spend about $36,000,000 this year in expanding its transmission and distribution facilities. Largest single item will be about $17,750,000 to be used in extending gas service to new customers and in related distribution projects. Around $7,200,000 will be spent in extensions and improvements to its natural-gas transmission system.

Three projects are involved in the latter. First of these is the installation of nearly 24 miles of 30-in. line as an extension of the Texas gas-transmission system. Its addition from southwestern to northwestern Los Angeles will result in the forming of an almost complete loop around the metropolitan area. The second will enable Southern California to receive additional gas from the La Goleta underground storage reservoir. The third, which will not be completed until next year, will enable the company to secure additional gas from Texas.

Present deliverability of gas from La Goleta, located near Santa Barbara about 100 miles northwest of Los Angeles, is about 275,000 M.c.f. daily. The new project, consisting primarily of the addition of two 20-mile sections of 22-in. line, will step up the reservoir's rate of delivery to about 365,000 M.c.f. daily. The new sections will be looped into existing transmission lines leading into the Los Angeles area.

Record Gas Production Set

WICHITA.—A record volume of marketed natural-gas production for the State of Kansas has been reported by T. A. Morgan, conservation director of the Kansas Corporation Commission.

Morgan said that 324,261,344 M.c.f. of natural gas (measured at a pressure base of 16.4 psi.), was delivered to pipe lines during 1950. This figure represents an increase of 60,833,429 M.c.f., or 23.1 per cent over the 1949 total when 263,427,915 M.c.f. of gas was marketed.

More than 88 per cent of the 1950 annual output came from the Kansas portion of the three-state Hugoton field where new all-time highs were established in production deliverability and number of gas wells on production.

The conservation director said that 1950 production from the Kansas part of Hugoton was at an all-time high of 286,002,324 M.c.f. This volume marked an increase of 64,582,099 M.c.f. or 29.2 per cent over the 1949 annual total for that sector when 221,420,225 M.c.f. was delivered to pipe lines. There were 2,216 gas wells on production in the Kansas sector of Hugoton as of December 31, 1950, comprising 46 per cent of the state total of 4,811 wells. The volume of gas-well completions in the entire State of Kansas held up during 1950 when 410 were drilled, including 6 wildcat discoveries. This compares with 420 gas wells drilled during 1949 including 8 wildcat gas fields opened.

"Narrows" Hookup O.K.'d

WASHINGTON.—Three New York companies have been authorized by the Federal Power Commission to construct facilities providing an alternative means for delivery of natural gas from Transcontinental Gas Pipe Line Corp. into the New York metropolitan area in event of a break or stoppage in Transcontinental's line.

Kings County Lighting Co., Brooklyn Union Gas Co., and Consolidated Edison Co. of New York, Inc., will build lines to interconnect with the terminus of Transcontinental's "Narrows Crossing" extension on the eastern bank of the Narrows at the entrance of New York Harbor.

Higher Gas Price Asked

SHREVEPORT. — Arkansas Louisiana Gas Co. has proposed an advance on the price of natural gas in the Waskom field area of Harrison County and adjoining Caddo Parish, Louisiana, and in Jefferson field of Marion County.

Application has been made to the Price Stabilization Board for approval of a price of 7 cents per 1,000 cu. ft. at the Waskom and Jefferson field refineries. The price increase would be retroactive to December 26, 1950. Under present agreements, the company has been paying 5 cents.

Natural Gasoline

Tex-Harvey Plans New Plant

MIDLAND, Tex.—Tex-Harvey Gasoline Co. will begin construction by July 1 of a modern absorption-type gasoline plant in Tex-Harvey oil field of east-central Midland County.

Cost of the plant and of a gathering system in the field to bring gas to it is estimated at between $5,500,000 and $6,000,000. The processing unit will have an initial capacity of between 30 and 35 million cubic feet of wet gas per day. Capacity can be increased to process 50 or 60 million cubic feet by the addition of a recently developed refrigeration process.

Daily production operating under initial capacity is expected by the company to run about 90,000 gal. of natural gasoline, 75,000 gal. of butane, and 90,000 gal. of propane. Operating pressure will be 825 psi.

Contract for construction will be let by June 1. Plans now are being drawn by an engineering company, and arrangements for obtaining the materials and equipment are being made. Contracts for gas are also being worked out with producers, as are agreements for disposal of residue gas.

The plant will be built in the central part of Tex-Harvey field. Present plans call for building a loading dock for shipping butane and propane on Texas & Pacific Railway tracks in northeastern Midland County. Natural gasoline will be moved through Tex-Harvey's pipe line running from the oil field to Midland.

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6 Men in the Iron and Steel Industry know from long experience that the McKee method of coordinated engineering reduces plant costs and speeds completion—that ***McKee Engineering means Assured Results.*** That's why they buy McKee Engineering.

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*DRISCOSE *is a trademark for Sodium Carboxymethylcellulose*

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Wyoming's Nugget

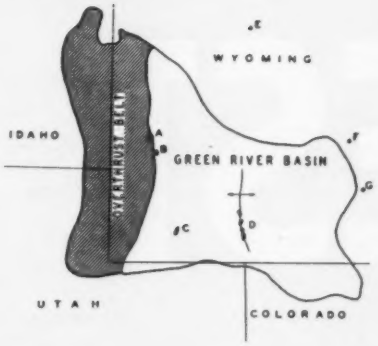
ALL but completely overlooked during the excitement caused by the report that Devonian oil had been discovered in North Dakota was General Petroleum Corp.'s simultaneous, less glamorous, but highly important announcement that its Tip Top well in Wyoming had flowed green oil at high rates on a drill-stem test of the Jurassic-Nugget sand.

The Tip Top discovery is significant for it is the first oil found below the Upper Cretaceous on the edge of a large overthrust belt that forms the western limit of the Green River basin. This means that Rocky Mountain oil hunters have added another province in which their chances for finding oil appear promising.

General Petroleum's well is in 12-38n-114w, Sublette County (A on map). The interval 9,688-9,728 ft. was tested for 2 hours and 35 minutes. Gas hit surface in 10 minutes and light-green, high-gravity (possibly 50°) oil flowed in 1 hour and 20 minutes at a rate estimated to be approximately 100 bbl. per hour.

Now at total depth of 9,807 ft. and preparing to plug back to about 9,720 ft. for completion in the Nugget sand, the Tip Top well found the following tops: Upper Cretaceous-first Frontier at 5,313 ft., second Frontier at 5,848 ft., Muddy at 6,723 ft., Thermopolis at 7,158 ft.; Lower Cretaceous-Cloverly at 7,251 ft.; Jurassic-Morrison at 7,667 ft., and the Nugget sand at 9,682 ft. Nearly 50 ft. of oil-saturated Nugget sandstone was cut above the oil-water contact called at 9,730 ft. A drill-stem test at 9,770-9,807 ft. yielded 1,940 ft. of mud and salt water.

The thick, basal, crossbedded Nugget sand is well developed in southwestern Wyoming. It thins eastward until it wedges out or loses its identity in the Jurassic-Sundance in central Wyoming. Westward from the eastern wedgeout the Nugget dips sharply into the Green River basin to a depth in the neighborhood of 25,000 ft. It rises gradually to the center of the basin where it crosses the Rock Springs anticline at a depth of 4,000 ft. and then dips into the deep portion of the basin west of the anticline to reach depths of around 15,000 ft. before being cut by the Absaroka and Darby overthrusts, which have pushed Paleozoics over Upper Cretaceous beds. The top of



the Nugget was called at nearly 15,000 ft. depth at Church Buttes field (C on map), which produces gas and a minor amount of condensate from the Lower Cretaceous-Dakota.

The Nugget sand is the main oil-producing bed at Steamboat Butte (E) and at Bailey Dome (F). The only other Nugget oil production in Wyoming at the time of the Tip Top strike was a small amount at Hatfield (G). At North Baxter Basin (D) the Nugget yields gas and condensate. It has been penetrated at both Middle and South Baxter Basin but has not been productive in these fields.

The Tip Top well is 2 miles west of another Tip Top structure test drilled by General Petroleum in 1948-49. That test found water in the Nugget and was completed dry at 10,692 ft. Nearest production to the new discovery is at La Barge (B) which lies about 10 miles to the southeast on a complexly faulted, low dome on an anticline about 2 miles east of the main portion of the overthrust belt. La Barge produces from the Paleocene-Evanston and the Upper Cretaceous-Hilliard, the latter being overthrust onto the Eocene-Wasatch at some well locations.

Helmerich & Payne, Inc., of Tulsa, has completed a farmout arrangement on a 13,000-acre block immediately to the southeast of the Tip Top well and is expected to start a deep test in the area in the near future. This test is considered to be but a forerunner of a series of deep tests resulting from the renewed interest in the area that has been stimulated by the Tip Top discovery.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN AREA.—Hathaway Brothers are preparing to test a wildcat in the State Line area, Montezuma County, Colorado, after finding shows in the Paradox. General Petroleum Corp. is running liner at the Tip Top, Wyoming, discovery after calling oil-water contact 48 ft. below top of the Nugget. Phillips Petroleum Co. and Carter Oil Co. are reported below 5,000 ft. at the St. Anthony, North Dakota, wildcat.

MISSISSIPPI.—Union Producing Co.-Jones-O'Brien 1 Logan, 23-10n-3w, Smackover venture on the west side of Tinsley field, Yazoo County, blew out making sour gas and mud while coring at 14,167 ft. This is 137 ft. below top of Smackover.

WEST TEXAS.—Shell Oil Co. 2 Sterling, Borden County wildcat located about in the middle of the 5-mile space between Von Roeder and Reinecke fields, has made a heavy flow of oil from reef limestone tentatively identified as Canyon. With dry holes on each side near the two producing areas, Shell's well may be the discovery of a new and separate structure. Kewanee Oil Co. prepared to run casing for completion at its 1 Sid Oliver, north of Salt Creek field. Last drill-stem test at 6,643-6,722 ft. recovered oil-cut mud and gas.

OKLAHOMA.—Another pool seems virtually assured for northwestern Stephens County where Shell Oil Co. 1 Tugman tested clean oil at an estimated rate of 20 bbl. per hour from a Pennsylvanian sand.

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PAULS VALLEY, OKLA.
PLAINVILLE, KANSAS
REFUGIO, TEXAS
SHREVEPORT, LA.
SNYDER, TEXAS
SUNDOWN, TEXAS
WICHITA FALLS, TEXAS

Texas Gulf Coast

North Flanks of Sour Lake Dome Gets Deep Producer

HOUSTON.—On the extreme north flank of Sour Lake Dome in Hardin County, deep oil production has been opened at Sun Oil Co. 1 Dishman-Lucas, Isaac Bridge Survey, Section 4, Abstract 132. Through perforations at 9,828-43 ft., the well flowed at the rate of 199 bbl. of 33.7°-gravity oil daily based on 14-hour drill-stem test. Tubing pressure was 1,400 psi. Total depth of the well is 11,025 ft.

Continental Oil Co. apparently has discovered new Wilcox oil production just northwest of Cabeza Creek field, Goliad County, at 34 J. E. Pettus, et al, S. Vela Survey. On drill-stem test in the Slick sand at 7,548-58 ft., recovery was 2,750 ft. of oil.

Meanwhile, Sunray Oil Corp. is extending oil production southwestward in Boyce field at B-2 A. M. Albrecht, CCSD&RGNG Survey, Abstract 343 Goliad County. Operator is preparing to perforate for completion after setting 5½-in. casing to 7,768 ft. Drill-stem test in this well at 7,506-25 ft. in the Slick sand tested gas-condensate. Drill-stem test in the Luling sand at 7,632-52 ft. recovered 272-ft. water cushion, plus 165 ft. of oil, through ¼-in. chokes. The well is located ⅝ mile southwest of oil production at Boyce field.

Delhi Oil Corp. 1 R. C. Lyne, wildcat test located 1¼ miles southeast of "Maxine" field discovery in Live Oak County, is coring below 7,068 ft. after testing gas at two levels in the Wilcox zone. On drill-stem test in the Slick sand at 6,981-7,013 ft., recovery was 270 ft. of gas-cut mud through ¼-in. chokes. The next drill-stem test was run at 7,051-68 ft., using ¼-in. chokes. Tool was open 20 minutes, and recovery was 20 ft. of mud.

Four miles east of New Ulm field, Austin County, Oil Drilling, Inc. 1 D. L. Hart, et al, wildcat, is now cleaning into pits preparatory to running potential test. On a drill-stem test at 9,556-73 ft., using ¼-in. chokes and 2,000-ft. water cushion, the well developed 200 psi. working pressure and recovered water cushion and 1,200 ft. of condensate and gas-cut mud. The discovery is located in David T. Davis Survey, Abstract 160.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Fort Bend County: Gas discovery—Harold Link, et al, 1 Schueneman, H&TC Sur., Sec. 18, A-644, TD 4,676 ft., perf. 4,626-37 ft., IP: 36,000,000 cu. ft. of gas per day, open flow, SIP 1,835 psi.

Live Oak County: Oil discovery—Tide Water Associated Oil Co. 1 Hicks Williams, F. G. Hines Sur., A-643, TD 7,802 ft., perf. Luling (Wilcox) 7,278-80 ft., IP: 92 bbl. oil per day, 38.4° gravity. 7/16-in. choke, TP 1,575 psi., CP 2,375 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: Phillips Petroleum Co. 1 Pursley, Hooper and Wade Sur., A-432, dry, TD 11,005 ft.

DeWitt County: Caroline Hunt Trust Estate 1 William Hoff, William Rouch Sur., A-247, dry, TD 9,669 ft.

Goliad County: D. J. Moss and Geo. D. Stevens 1 Sophie Heller, H. C. Kitchen Sur., A-174, dry, TD 4,114 ft.

Jackson County: The Texas Co. 1 T. N. Mauritz, et al, NCT 1, R. D. Moore Sur., 3 mi. S-SW of Francitis, dry, TD 9,522 ft.

Live Oak County: V. G. Schimmel, et al, 1 Kittie Burns Lennox, G. L. Haas Sur. 59, midway between Kittie Burns and Clay West fields, dry, TD 3,860 ft.

Matagorda County: Josey, Inc. 1 Hawkins, Williams League, A-106, dry, TD 6,257 ft.

Wharton County: Columbian Fuel Corp. 1 Hutchins-Pearson, HE&WT Sur., A-440, dry, TD 5,319 ft.

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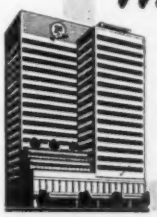

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Oklahoma

Stephens County Test Indicates Oil Discovery

ANOTHER new pool seems virtually assured for northwestern Stephens County where Shell Oil Co. 1 Tugman, a wildcat located 2 miles west of Marlow in the NE SW NE 11-2n-8w, flowed clean oil at an estimated rate of 20 bbl. per hour in a drill-stem test of a Pennsylvanian sand, top of which was logged at 6,073 ft.

Two tests were made in the section, the first of an interval at 6,078-6,112 ft. and the other at 6,132-43 ft. The oil flow was made during the test of the upper interval. Oil was at the surface minutes after the tester was opened and flowed for 33 minutes until the tool was closed. Approximately 360 ft. of 38.7°-gravity oil was recovered.

Test of the lower interval showed salt water with the oil. In it the well did not flow. Recovery in the breakdown after tool had been open 60 minutes was 90 ft. of heavily oil and gas-cut mud, 2,670 ft. of fluid (16 per cent 43°-gravity oil and the remainder salt water), and 1,290 ft. of salt water.

Currently, the hole is being drilled ahead to prospective deeper productive horizons. Location is about 2 miles southeast of the Beaver pool, opened last September with production from Pennsylvanian Hoxbar sand at 7,000-7,100 ft. It also is about 1½ miles southwest of the somewhat older Northwest Marlow pool, which has two wells in a 9,000-ft. sand.

Casing has been run to test two possible pay zones logged by Deep Rock Oil Corp. in its 1 Scott, C SW NE 22-9n-14w, deep wildcat test 11 miles northwest of Mountain View, Washita County, western Oklahoma. The two intervals, indicated by electric log, are at 7,964-8,085 ft., in what may be the Yule sand, and 8,584-8,635 ft., possibly the Wade sand. No drill-stem tests were made of these zones, drilled to a total depth of 12,020 ft., has been plugged back to 8,800 ft.

Producing from both the Wilcox sand and the dolomite zone, Midstates Oil Corp. 1 Harris, NE NE NW 20-28n-2w, which opens a promising new pool 12 miles northwest of Blackwell in northwestern Kay County, flowed 262 bbl. of oil in 12 hours through open tubing, and then made 105 bbl. in 6 hours through 1½-in. opening. It has been shut in for storage. The dolomite zone is producing from open hole below casing at 4,628-56 ft. Wilcox sand is producing through casing perforations at 4,613-28 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Comanche County: Tide Water Associated Oil et al 1 Myers, NE NE NW 10-4n-11w, flowed 1,670,248 cu. ft. of gas plus some distillate from detrital zone at 3,440-80 ft., TD 4,071 ft., Pontotoc conglomerate 1,460 ft., Simpson 1,504 ft., bromide sand 1,578 ft., Tulip Creek 2,021 ft., Arbuckle 3,479 ft., elev. 1,237 ft.

Cotton County: NW extension to Essaquanahdale—T. A. Norwood et al 1 Taylor, NE NW NW 29-3s-11w, pumped 24 bbl. oil per day from sand at 1,494-1,500 ft., TD 1,600 ft., elev. 981 ft.

Hughes County: T. J. Carter et al 1 Nance, NW NE SW 12-8n-8e, pumped 120 bbl. oil per day from Cromwell at 3,335-45 ft., TD; Booch sand 2,880 ft., Gilcrease 3,070 ft., elev. 818 ft.

Murray County: Hobson & Brown 1 Sadler, SW SW SE 20-1n-2e, pumped 24 bbl. oil per day from limy sand at 1,863-1,978 ft., TD 2,110 ft., elev. 892 ft.

Noble County: Bay Petroleum Corp. 1 Jerome et al, SE SE SW 15-20n-2w, pumped 25 bbl. oil per day from Perry sand at 3,718-30 ft., TD 5,237 ft., Avant 3,550 ft., Layton 4,016 ft., Checkerboard 4,480 ft., Oswego 4,610 ft., Bartlesville 4,917 (?) ft., Woodford 5,028 ft., Viola 5,100 ft., Wilcox 5,175 ft., second Wilcox 5,210 ft., elev. 1,193 ft.

OKLAHOMA WILDCAT FAILURES

Lincoln County: McLean-Huffman & Malloy 1 Ellison, SE NE SW 4-12n-6e, dry, TD 3,650 ft., Hogshooter 1,933 ft., Layton 2,037 ft., Checkerboard 2,305 ft., Oswega 3,206 ft., Prue sand 3,218 ft. and 3,245 ft., Verdigris 3,332 ft., lower Skinner sand 3,400 ft., Red Fork 3,618 ft. and 3,628 ft., elev. 957 ft.

H. L. Berkey 1 Irvine, NW SW SE 21-12n-6e, dry, TD 4,702 ft., Checkerboard 2,200 ft., Peru 3,078 ft., Oswego 3,165 ft., Prue 3,171 ft., Verdigris 3,273 ft., Red Fork 3,580 ft., Inola 3,688 ft., Bartlesville 3,693 ft., Caney 3,950 ft., Woodford 4,332 ft., Hunton 4,364 ft., Sylvan 4,491 ft., Viola 4,582 ft., second Wilcox 4,687 ft., elev. 963 ft.

Viersen & Cochran 1 Stanfill, SE SE NW 16-14n-3e, dry, TD 5,162 ft., Hogshooter 3,095 ft., Checkerboard 3,440 ft., Oswego 4,075 ft., Prue 4,130 ft., Skinner 4,316 ft., Mayes 4,680 ft., Woodford 4,784 ft., Hunton 4,840 ft., Sylvan 4,898 ft., Viola 5,000 ft., Wilcox 5,085 ft., second Wilcox 5,126 ft., elev. 874 ft.

Foster Drilling 1 Kluck, SE SE SW 35-17n-5e, dry, TD 3,516 ft., Checkerboard 2,459 ft., Big lime 3,054 ft., Oswego 3,075 ft., Red Fork 3,414 ft., elev. 917 ft.

Logan County: Oklahoma Natural Gas Co. 1 Lesh, SE SE NW 7-17n-2w, dry, TD 6,082 ft., Pawhuska 2,456 ft., Deer Creek 2,676 ft., Oread 3,336 ft., Tonkawa 3,651 ft., Avant 3,898 ft., Dewey 3,948 ft., Layton 4,305 ft., Hogshooter 4,628 ft., Checkerboard 4,773 ft., Big lime 5,061 ft., Oswego 5,179 ft., Mississippi lime 5,437 ft., Woodford 5,597 ft., Misener 5,663 ft., Hunton 5,665 ft., Sylvan 5,675 ft., Viola 5,770 ft., dense 5,833 ft., dolomite 5,889 ft., second Wilcox 6,031 ft., elev. 1,018 ft.

Pawnee County: Foundation Oil Co. and A. A. Cameron 1 School Land "A," NE SE SW 16-21n-6e, dry, TD 3,199 ft., Avant 1,602 ft., upper Layton sand 1,685 ft., Hogshooter 1,864 ft., lower Layton sand 1,940 ft., Checkerboard 2,266 ft., upper conglomerate Oswego 2,450 ft., Prue 2,631 ft., Verdigris 2,702 ft., Woodford 3,128 ft., Misener 3,150 ft., Simpson 3,155 ft., Wilcox 3,170 ft., elev. 893 ft.

Davis & Wharton Drilling 1 Thornton, NW NE NE 10-22n-3e, dry, TD 4,196 ft., Avant 2,284 ft., Layton 2,778 ft., Checkerboard 3,193 ft., Oswego 3,324 ft., Verdigris 3,548 ft., Skinner 3,614 ft., Red Fork 3,692 ft., Mississippi lime 3,863 ft., Woodford 4,120 ft., Wilcox 4,179 ft., second Wilcox 4,189 ft.

Payne County: Foster Drilling 1 Pence, NE SE NE 21-18n-6e, dry, TD 3,134 ft., Big lime 2,655 ft., Oswego 2,696 ft., Red Fork 3,022 ft., Bartlesville 3,113 ft., elev. 823 ft.

Wilcox Oil Co. 1 Brown, NE NE SE 12-19n-1e, dry, TD 4,974 ft., Checkerboard 3,748 ft., Big lime 3,940 ft., lower Skinner 4,310 ft., Red Fork 4,358 ft., Mississippi lime 4,527 ft., Hunton 4,750 ft., Viola 4,848 ft., Wilcox 4,918 ft., second Wilcox 4,965 ft., elev. 918 ft.

Pittsburgh County: W. S. Wright 1 Mitchell, NE NW NE 11-2n-16e, dry, TD 440 ft.

Pontotoc County: W. H. Pine 1 Johnson, NE SW SE 9-3n-7e, dry, TD 2,286 ft., Hunton 1,507 ft., Sylvan 1,896 ft., Viola 2,026 ft., elev. 854 ft., geological test in E. Ada district.

Finston & Co. 1 Wilson, SW NW SW 26-4n-5e, dry, TD 2,681 ft., Calvin 1,007 ft., Caney 1,095 ft., Sylvan 2,114 ft., Viola 2,233 ft., Simpson 2,375 ft., Wilcox 3,596 ft., elev. 909 ft.

Seminole County: W. E. Bendeler 1 Gosey, SE SW SW 6-7n-7e, dry, TD 4,350 ft., Calvin 1,860 ft., Senora lime 2,232 ft., Earlsboro 2,500 ft., Union Valley 3,145 ft., Cromwell 3,205 ft., Caney 3,630 ft., Mayes 3,850 ft., Sylvan 4,130 ft., Viola 4,152 ft., Wilcox 4,242 ft., second Wilcox 4,330 ft., elev. 849 ft.

C. C. Nye 1 Kiker, NW SE NE 9-10n-7e, dry, TD 3,700 ft., Checkerboard 1,415 ft., Oswego 2,192 ft., Calvin 2,226 ft., Henryetta coal 2,660 ft., Senora lime 2,750 ft., Senora sand 2,760 ft., Earlsboro 3,020 ft., Inola 3,215 ft., Booch 3,491 ft., Gilcrease 3,619 ft., Union Valley-Cromwell 3,633 ft., second Cromwell 3,673 ft., third Cromwell 3,691 ft., elev. 903 ft.

Stephens County: Kerr-McGee et al 1 Killingsworth, SE SW SE 13-2s-5w, dry, TD 5,945 ft., Hoxbar 1,100 ft., Dense 1,460 ft., Tussy sand 2,645 ft., Tussy lime 2,705 ft., lower Dornick Hills 2,86 ft., Wayanucka 3,500 ft., Springer 4,43 ft., Caney 5,790 ft., elev. 1,041 ft.

L. A. Edwards, Jr. 1 Freeman "B," SE SE SW 17-3s-5w, dry, TD 2,900 ft., Loco lime 1,349 ft., Arbuckle detrital 2,754 ft. Arbuckle lime 2,834 ft.

North Central Texas

Fisher County Discovery Completed in Ellenburger

WICHITA FALLS.—Stanolind Oil & Gas Co.'s Ellenburger discovery east of the Central Basin Platform has been completed for 211.44 bbl. of oil a day. The new producer is 1 M. A. Glass, located ½ mile east of the town of Pyron, but across the line in southwestern Fisher County. Completion gage was through 12/64-in. choke the first 17½ hours and through 10/64-in. choke the last part of the 24-hour test. It was completed without acid, from open-hole pay at 7,328-47 ft.

In Shackelford County Big West Drilling Co. drilled its 15 Nail as a water well but found flowing oil and had to plug back in order to complete for water. Location is northwest of the town of Albany and an outpost to nearby shallow production. Flowing oil estimated at 60 bbl. a day was found in the Cook sand from 1,378-90 ft. Operators were to skid the rig 140 ft. north and drill to the oil sand.

A shallow discovery in Jones County was waiting on completion tests. Woodley Petroleum Co. 1 Bartlett, northwest of Nugent, showed for an estimated 40 bbl. of oil a day from the Bluff Creek section topped at 1,871 ft.

A good confirmation well to new Strawn sand production southeast of Graham in Young County has been brought in at Greenbrier Oil Co. 1 Eppenauer-Corley, which is a north offset to the discovery. The second well flowed 157 bbl. of 42°-gravity oil a day through 20/64-in. choke.

In Clay County an equally good confirmation well was completed in the new Simpson field 2 miles west of the Bryant Edwards field. Stephens Petroleum Co. 1 Blakely, west offset to the discovery, completed for 200 bbl. of 44°-gravity oil a day through ¾-in. opening in tubing. Top of pay was reported at 6,224 ft. and tubing was run to 6,254 ft.

C. W. Gore's 1 Dean Bros., Shackelford County Ellenburger discovery northwest of Sedwick, flowed 336 bbl. of 47°-gravity oil a day on potential test. The flow was through 16/64-in. choke from open hole at 4,235-43 ft. The discovery is a little less than 2 miles from nearest Ellenburger production but separated from the area by dry holes.

NORTH CENTRAL TEXAS (DISTRICTS 7 AND 7-B) SUCCESSFUL WILDCATS

Archer County: Hale & West 1 D. M. Powell, SPRR Sur. 1, 1 mi. E Archer City, TD 3,794 ft., pay 3,780 ft., pumped 173 bbl. 41°-gravity oil a day.

Eastland County: Bob Vought 1 Hightower-Gray, Wm. Van Norman Sur., 8 mi. N Eastland, TD 1,183 ft., pay sand 1,174 ft., pumped 14 bbl. 37°-gravity oil.

Haskell County: Crown Central Petroleum Corp. 1 W. T. Overby, 48-1-H&TC, 5 mi. SW Haskell, TD 5,669 ft., PB 4,23 ft., elev. 1,587 ft., perf. 4,861-67 ft., flowed 79 bbl. 43°-gravity oil a day, 26/64-in. choke, GOR 1,850 cu. ft.

Jack County: Denzil Morrow 2 Gillespie, W. Brown Sur., 8 mi. SW Antelope, dry, TD 492 ft., pumped 15 bbl. oil a day.

Denzil Morrow 2 Gillespie, Brown. Sur., 8 mi. SW Antelope, TD 506 ft., 10.4 bbl. 40°-gravity oil.

Jones County: Sojourner Drilling Co. 1

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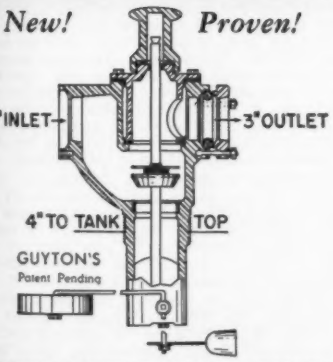

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J. L. Crow, J. H. Gibson Sur., 1½ mi. W Bartlett field, TD 3,410 ft., perf. 3,398-3,405 ft., pumped 84 bbl. 41°-gravity oil a day.

Nolan County: Rowan & Hope, Inc. 2 Irl Faver, 47-21-T&P, 4½ mi. NE Sweetwater, TD 6,217 ft., PB 3,344 ft., elev. 2,101 ft., perf. lower Cisco 3,904-12 ft., pumped 85 bbl. 29°-gravity oil a day.

Stonewall County: Cities Service Oil Co. 1 Flat Top 161, Sec. 161, BBB&C Sur., TD 6,275 ft., elev. 1,681 ft., pay 5,258 ft., pumped 35 bbl. 42°-gravity oil a day.

Young County: J. W. Hastings 1 C. W. Johnson, E. W. Sergeant Sur., 4 mi. NW Loving, TD 3,198 ft., pay 3,136 ft., flowed 120 bbl. 42°-gravity oil a day, 16/64-in. choke.

J. W. Hastings 1-A Johnson, Sergeant Sur., 4 mi. NW Loving, TD 3,455 ft., pay 3,429 ft., flowed 240 bbl. 42°-gravity oil a day, 16/64-in. choke, TP 160 psi., GOR 600 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: G. W. Cooper 1 Ford "E," J. S. Brooks Sur., 4 mi. E Holliday, dry, TD 4,730 ft.

S. D. Johnson 1 C. L. Abercrombie, Clark & Plumb Subd., 5 mi. S Scotland, dry, TD 4,010 ft.

G. E. Kadane 1 G. D. Noles, Hooper & Wade Sur., 2 mi. SE Dundee, dry, TD 4,488 ft.

McElroy Ranch Co. 2 Wilson "B," 84-810-ATNCL, 3 mi. NE Geraldine, dry, TD 4,070 ft.

Neeld & Hood Drilling Co. 1 J. W. White "B," 8-42-ATNCL, 6 mi. N Archer City, dry, TD 1,617 ft. in Gunsight sand.

Brown County: T. G. Shaw 1 Mrs. Alice McDonald, C. J. Carrier Sur., 3 mi. SE Bangs, dry, TD 3,347 ft., elev. 1,600 ft., Gray lime 1,780 ft., Ellenburger 1,840 ft., Hickory sand 3,334 ft.

Clay County: S. D. Johnson 10 Frank Henry, Clark & Plumb, between Archer City and Windthorst, dry, TD 3,651 ft.

Cooke County: F. W. Fischer 1 F. W. Fischer, Wm. Phelps Sur., 6 mi. SW Era, dry, TD 2,336 ft.

Eastland County: Lyles & Tolbert 1 Helen Latham, 32-4-H&TC, 3 mi. NW Eastland, dry, TD 3,708 ft., elev. 1,491 ft., upper Ranger 3,505 ft., lower Ranger 3,550 ft.

Fisher County: Moutray-Moore Drilling Co. 1 J. S. Inzer, 192-1-BBB&C, 5 mi. NW Hamlin, dry, TD 3,845 ft.

Norwood Drilling Co. 1 R. E. Hale, 295-2-H&TC, 7 mi. N Rotan, dry, TD 5,503 ft. in Pennsylvania.

Haskell County: Basin Oil Co. of California 1 C. A. Merchant, 12-110-H. O. Campbell, 2½ mi. SE Haskell, dry, TD 3,680 ft., elev. 1,521 ft., Palo Pinto 3,646 ft.

Bridwell Oil Co. 1-A T. G. Hendrick, Indianola RR Srp., 15 mi. SE Haskell, dry, TD 3,132 ft.

W. H. Bryant 1-A Ada Couch, W. Maxwell Sur., 5 mi. SE Weinert, dry, TD 3,120 ft.

The Texas Co. 1 Swenson Land & Cattle Co., BBB&C Sur., 1 mi. NW Stamford, dry, TD 3,130 ft.

Jack County: Benson Montin, Inc. 1 M. E. Roper, Navarro CSL, 3 mi. SW Jacksboro, dry, TD 5,685 ft.

Cloughley & Jennings 2 Hunt, J. A. Jackson Sur., 7 mi. SE Antelope, dry, TD 543 ft.

T. M. Weatherred 2 Ellis & Ellis, J. V. Williams Sur., 4 mi. S Antelope, dry, TD 576 ft.

Jones County: Edward C. Lawson 2 J. B. Young, Walton, Hill & Walton, 2 mi. SE Radium, dry, TD 3,110 ft.

Robinson-Puckett, Inc. 1 T. C. Moss, OAL Sur., 2 mi. NE Anson, dry, TD 4,113 ft.

Nolan County: Intex Oil Co. 1 D. S. Riggs, 61-23-T&P, 4 mi. SW Sweetwater, dry, TD 7,004 ft.

Cities Service Oil Co. 1-B Etheridge, 12-24-T&P, 3 mi. SE Wastella, dry, TD 7,455 ft., Strawn 6,841 ft., Ellenburger 7,239 ft.

Palo Pinto County: Irving Greenspan and Jefferson Oil Co. 1-B Pennington heirs, S. F. Herring Sur., 7 mi. SW Graford, dry, TD 1,810 ft.

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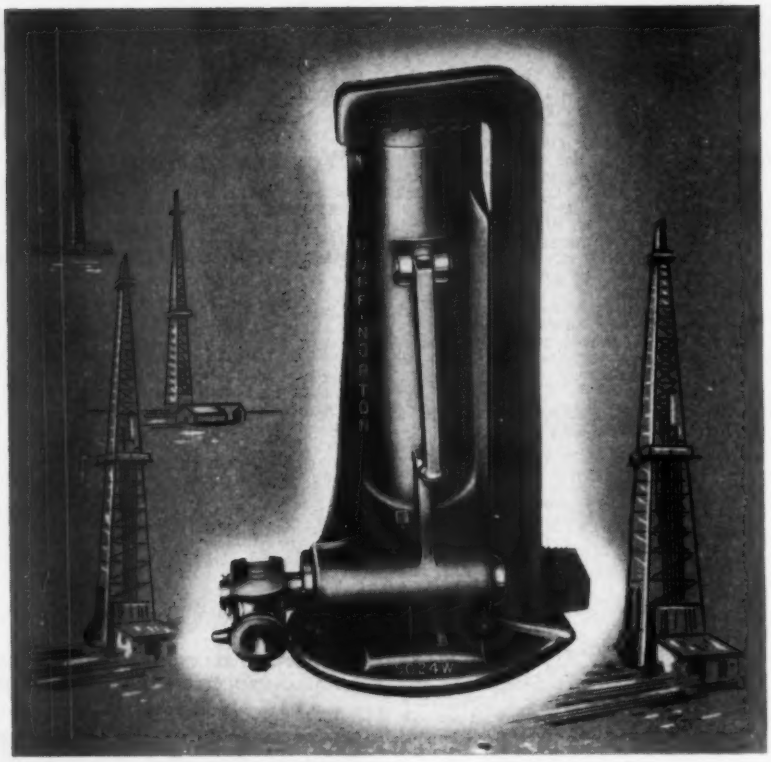

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Shackelford County: M. J. Mitchell 1-A W. H. Green, BAL Sur., 5 mi. SE Albany, dry, TD 670 ft.

Stonewall County: U. S. Smelting, Refining & Mining Co. 1 Patterson, H&TC Sur., 5 mi. NE Jayton, dry, TD 5,345 ft., elev. 1,885 ft., reef 5,300 ft.

Taylor County: Robinson-Puckett, Inc. 1 O. C. Parrish, T. Lindsey Sur., 4 mi. SE Shep, dry, TD 5,604 ft., in the Ellenburger, reef 3,565 ft.

Throckmorton County: Lester Miller Drilling Co. 1 Otis Hibbitts, 964-330-TE&L, 2 mi. NW Woodson, dry, TD 2,730 ft.

Wilbarger County: J. J. Lynn 1 Streit Bros., 19-9-H&TC, 7 mi. S Lockett, dry, TD 3,772 ft.

Frank Wood 1 W. T. Waggoner "GG," MEP&P Sur., 9 mi. SW Harrold, dry, TD 2,500 ft.

Mississippi

Yazoo County Blowout Points to Smackover Well

JACKSON. — Smackover exploration in Mississippi gained impetus during the week when Union Producing Co.-Jones-O'Brien 1 Logan, 23-10n-3w, on the western side of Tinsley field, Yazoo County, blew out making sour gas and mud while coring at 14,167 ft. This is 137 ft. below top of Smackover. The last core, pulled at 14,100-43 ft., was dark grey to black, dense, sparsely oolitic limestone and dark grey, calcareous sand with zero porosity and permeability. Operator was using 11.5-lb. mud when the well started to kick. The kick was light at first, but in 1 hour had increased until mud was blown approximately 50 ft. above the derrick floor. Blow-out preventers were closed and pressure was bled off below the rams.

Approximately 10,000 sacks of mud were pumped into the well, after which the drill pipe and core barrel were stuck. Operators cemented bottom of hole and drill pipe with 300 sacks. This did not hold and the well blew again, but was killed. It has not been determined whether the gas is coming from bottom of the hole or from some sand up the hole which might have charged while the well was blowing out. Operator will fish out drill pipe, set whipstock and drill in a side-tracked hole to near the top of the Smackover. If completed as a commercial producer, this will be the first Smackover production in Mississippi.

Meanwhile, the other Smackover ventures in the state have encountered no shows. In Madison County, Continental Oil Co. 1 John R. Cameron, 36-10n-1e, is reaming down preparing to run electric log after coring to 14,008 ft. in Smackover, which was topped at 13,717 ft.

In Wilkinson County, the new Wilcox discovery, Jon Brooks-Petersen Drilling Co. 1 Louis Wax, 36-3n-3w, is shut in waiting on storage. Testing operations have been delayed because of heavy rains. On initial test, the well flowed 175 bbl. of 32°-gravity oil daily through perforations at 7,299-7,303 ft.

Wilcox gas-condensate production is being established in Baxterville field, Lamar County, at Gulf Refining Co. G-2 Virgil Davis, et al, 7-1n-16w. Through ¼-in. choke the well flowed at the rate of 1,900,000 cu. ft. of gas per day plus 13.3 bbl. of condensate, through perforations at 5,182-90 ft. Additional perforations were made at 5,168-78 ft. and 5,074-86 ft. Operator ran tubing and will continue to test.

MISSISSIPPI WILDCAT FAILURE

Jones County: Gulf Refining Co. 1 Doyle Lyons, 34-10n-12w, dry, TD 8,026 ft.

ALABAMA WILDCAT FAILURE

Clarke County: John S. Neilson-W. E. Walker 1 Tensaw Land & Timber Co., 32-6n-2e, dry, TD 7,505 ft.

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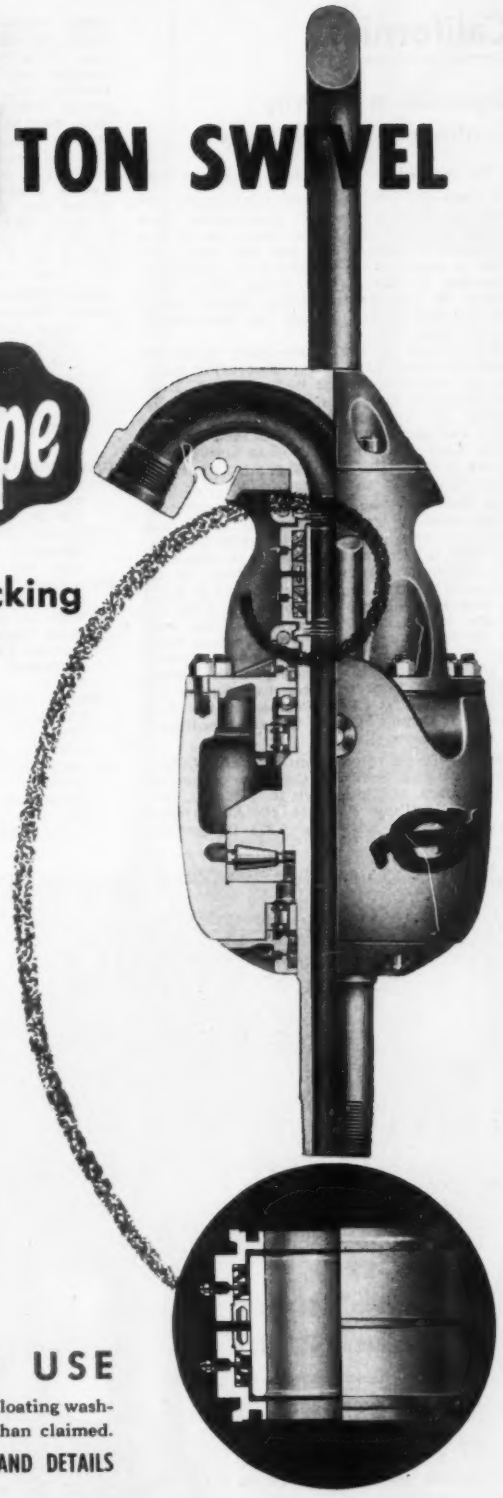

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California

Exploration Activity Continues at High Rate

LOS ANGELES.—California operators continue to increase their exploratory efforts to develop new oil production. This action is reflected in the fact that of the 566 wells completed so far this year, almost a fourth were wildcats or extension attempts. In the past 2 weeks they completed 26 exploratory tests, almost twice the number drilled during the like period a year ago.

While bulk of the exploratory wells are shallower than 2,500 ft., an increasing number of deeper tests are being drilled. During the first quarter of this year, footage drilled in wildcats ranged between one-third and one-fourth of that drilled in field wells. Last week, all California activity resulted in the drilling of 161,962 ft., of which 73,544 ft. was in exploratory holes.

In the Los Angeles area two operators are continuing their efforts to open new pools. At Sunset Beach in Orange County, Sunview Oil Co. was preparing to run tubing and install pumping equipment in its 1 Sunset Heights. Hole was carried to 6,248 ft. before being plugged back to 4,678 ft., in the lower Pliocene, where casing was set. In Bartholomaus Canyon, Section 6-2s-14w, W. W. Bush 1 Bartholomaus Bush-Bar is still reported as standing with casing cemented at 1,625 ft. after topping an oil sand at 1,600 ft. Bell Petroleum Co. has staked 1 Dubois about ¼ mile southeast of the Bush well.

In extreme southeast San Joaquin Valley, Humble Oil & Refining Co. was preparing to plug back and sidetrack its 1 K.C.L. (34-35) after drilling to 5,451 ft. At various depths between 3,729 and 4,373 ft. several shows were found, some of which were tested to show small amounts of oil and mud. It is thought Humble will attempt to deviate hole and make another effort at finding oil production in one of these sands. The wildcat is in the Pleito Creek area, Section 35-11n-21w, about 3 miles southeast of Wheeler Ridge production.

In the nearby Tejon Hills area, shallowest production to date was registered by Hannah & Woods at its 2 H. & W. in Section 10-11n-18w. It was completed as a 45-bbl. pumper, 28.8° gravity, in the Santa Margarita at a total depth of 367 ft. They completed the 3 H. & W. as an 80-bbl. pumper at a total depth of 377 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Santa Barbara County, ½ mile east of South Cuyama, either new pool or extension to Hibberd zone: Richfield Oil Corp. 35-5 Cox, 5-9n-26w, flowed at rate of 574 bbl. daily through 42 ft. of perf. at 5,864-96 ft., 36.5°-gravity crude cut 2.4 per cent, 15/64-in. bean, TD 5,988 ft., redrilled 5,955 ft. and plugged back to 5,900 ft., elev. 2,774 ft.

CALIFORNIA UNSUCCESSFUL WILDCATS

Fresno County, Coalinga area: Max Pray and E. Walker, Jr., 74-19 "Well," 19-18s-15e, dry, TD 5,937 ft., elev. 806 ft.

Panoche Creek area: L. M. Lockhart 1-31 England, 31-14s-13e, dry, TD 10,357 ft., elev. 419 ft.

Kern County, Coles Levee area: D. D. Feldman 85-8 B.V.A., 8-31s-25e, dry, TD 9,300 ft., elev. 335 ft.

Edison Groves area: Trico Oil & Gas Co. 1 State Exploration Co., 33-29s-29e, dry, bottomed in shale, TD 3,800 ft., elev. 600 ft.

Tunis Creek area: Standard Oil Co. of California 83-31 Tejon Ranch-9, 31-11n-18w, dry, bottomed in basement, TD 3,155 ft., elev. 846 ft.

Los Angeles County: Castaic Junction area: Humble Oil & Refining Co.-British American C-1 Newhall Land & Farming Co., 1-4n-17w, dry, TD 11,440 ft., elev. 1,050 ft.

Dominguez area: Dunlap & Bell 1 Kim-Bell, 32-3s-13w, dry, Repetto 4,810 ft., Miocene 7,350 ft., 8th Callender Zone 8,060 ft., TD 8,090 ft., elev. 22 ft.

Lopez Canyon area: Terminal Drilling Co. 1 Lloyd, 36-3n-15w, dry, TD 3,470 ft., elev. 1,293 ft.

Palos Verdes area: McVicar, Rood & Cole Co. 1 "Well," proj. 16-5s-14w, dry, TD 2,005 ft., elev. unknown.

Puente Nose area: The Texas Co. 1 Puente One, 6-2s-10w, dry, TD 7,171 ft., elev. 1,625 ft.

Orange County, Richfield area: Loumac Oil Co. 1 Gibson-A.U.W., 19-3s-8w, dry, TD 2,606 ft., elev. unknown.

Ventura County, Pointe Hueneme area: Oceanic Oil Co. 1 J. R. Petit, proj. 23-1n-22w, dry, TD 225 ft., elev. 59 ft.

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Montezuma County Wildcat Preparing to Drill Plug

DENVER.—Hathaway Brothers 1 Lyons-Federal, NE SW SE 11-37n-20w, wildcat in the Utah State Line area, Montezuma County, Colorado, is nearing completion. The well was drilled to 5,505 ft., total depth, and with casing cemented at 5,486 ft., the operator is now preparing to drill plug. The test found well-saturated cores between 5,495-5,505 ft., in the Paradox, but complete data of the cores has not been released. This well is about 10 miles southwest of the Dove Creek structure where Byrd-Frost et al 2 years ago found a high gas-distillate ratio discovery in a porous zone of the Paradox. Subsequent drilling at Dove Creek was a disappointment and the well has been shut in, except for testing periods, pending market arrangements. Because of increased gas outlet for the San Juan basin, and new proposed lines, the wildcat is of considerable importance in that it may open sizable oil or gas reserves.

General Petroleum Corp. is now running liner for a test of the Nugget at the discovery 4-X-12-G, SW SW NW 12-28n-114w, in the Tip Top area, Sublette County, Wyoming. The well flowed at the rate of 100 bbl. of oil per hour on drill-stem test from 9,688-9,728 ft. last week. A core from 9,768-9,808 ft. showed saturated sand to 9,788 ft., with a 10-ft. sand showing water. On drill-stem test 9,770-9,808 ft., the well made 2,940 ft. of drilling mud and salt water in 3 hours. The 9⅝-in. casing is cemented at 7,720 ft. and General Petroleum will run liner from this zone for completion of the discovery. This wildcat is one of the most important through the Green River Basin of Wyoming in recent years and is the first to find production in the overthrust belt along the west side of the basin.

Phillips Petroleum Co. and Carter Oil Co. are reported to be below 5,000 ft. at their 1 fee, C NE NW 29-136n-81w, wildcat in the St. Anthony area, Morton County, North Dakota. The well is a tight hole, and no information is being released. This is the only well now drilling in North Dakota other than the Amerada Petroleum 1 Iverson, C NW SW 6-155n-95w, in the Beaver Lodge area, Williams County, which last week found oil and gas in the Devonian-Silurian at 11,630-60 ft. Amerada is now rerunning tubing after checking a split zone. The well flowed 307 bbl. of 47.5°-gravity oil and an estimated 6,000,000 cu. ft. of gas in 17 hours through ¾-in. choke.

COLORADO WILDCAT FAILURE

Logan County: Trigood Oil Co. J-6 McLane, SW SW NW 34-7n-54w; TD 5,136 ft., abandoned.

WYOMING WILDCAT FAILURES

Johnson County: American Liberty Oil Co. 14 Federal-Hill, NW NE SW 33-42n-78w; TD 4,780 ft.; abandoned.

Palisades Petroleum Co. 1 Hintze, NW SW NW 13-42n-78w; TD 4,820 ft.; abandoned.

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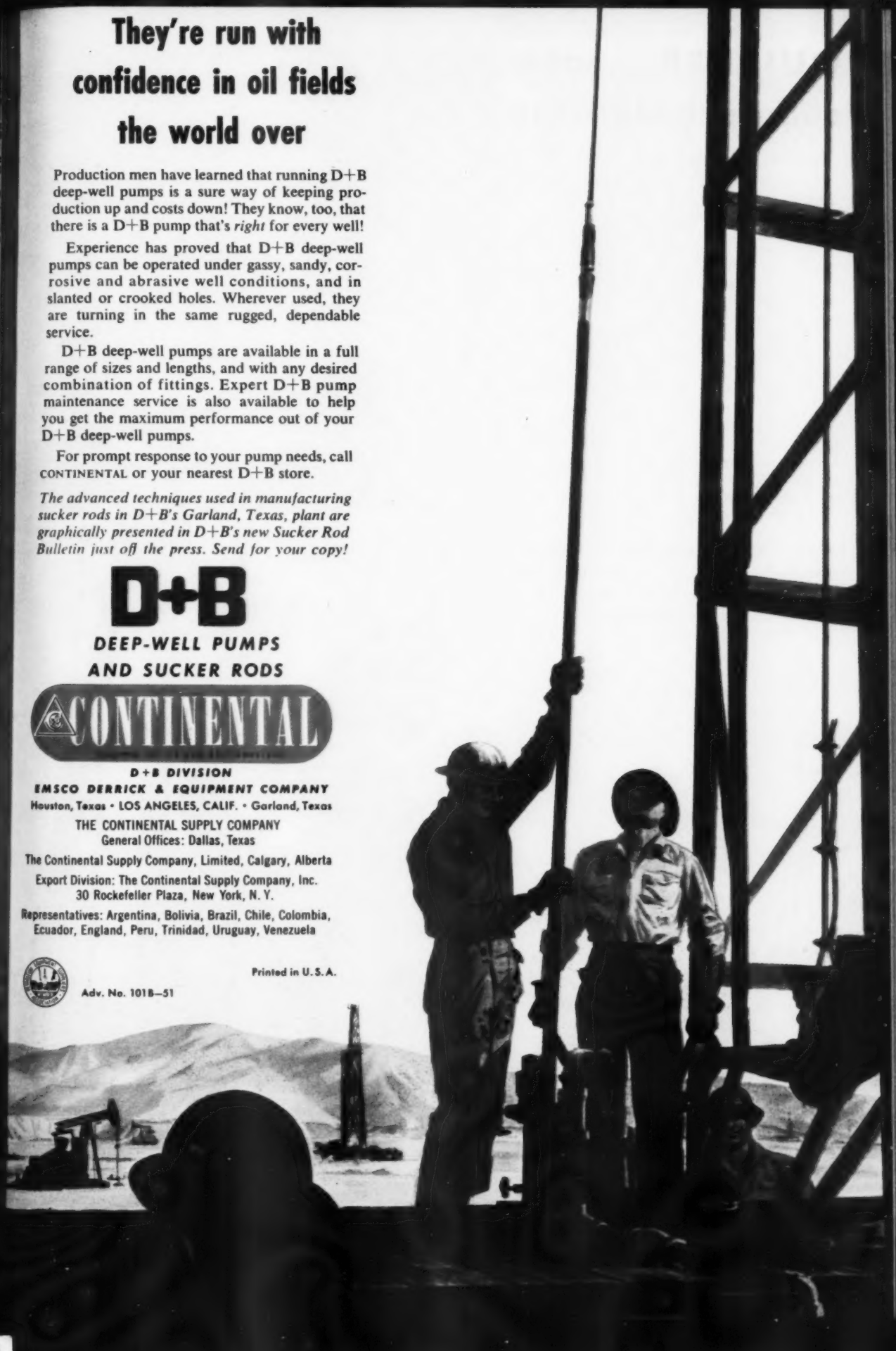

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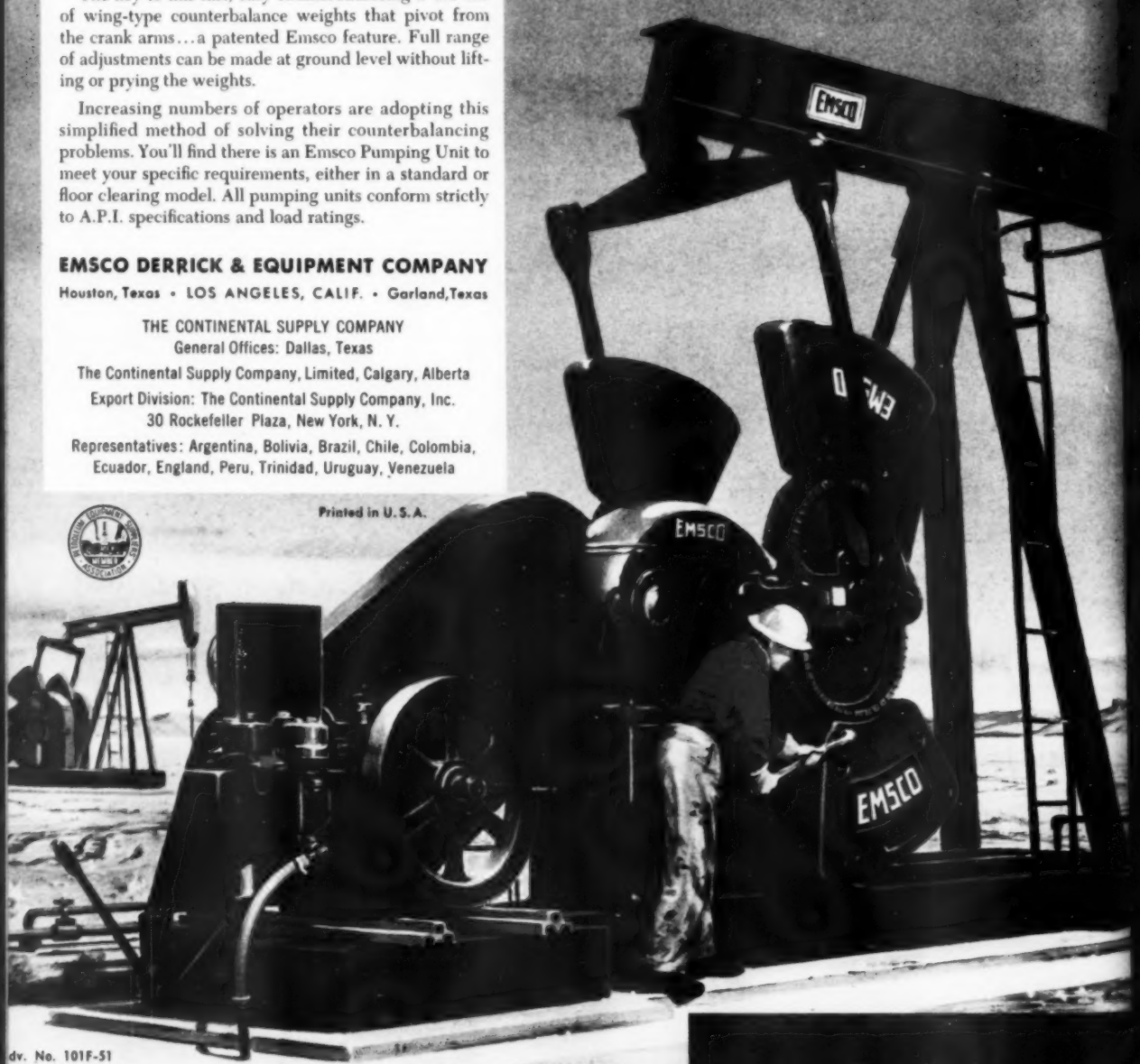

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Niobrara County: H. L. Hollingsworth 1 Govt., SW SE SW 28-38n-61w; TD 2,450 ft.; abandoned.

MONTANA WILDCAT FAILURES

Blaine County: Munger 1 Harbolt, NW NW SW 1-35n-20e; TD 4,193 ft.¼ suspended.
Jefferson County: Dunbar 2 Dunbar, NE NE NE 11-2n-1w; TD 760 ft.; suspended.

NORTHERN NEW MEXICO WILDCAT FAILURE

San Juan County: Southern Union Gas Co. 1 Starr, SW NE NE 6-26n-8w; TD 2,071 ft.; abandoned.

NEBRASKA WILDCAT FAILURES

Cheyenne County: Z. S. Frank and A. J. Schoen 1 Henzl, SE SE SE 25-13n-48w; TD 4,650 ft.; abandoned.
Sheridan County: Valentine Oil Co. 1 Murphy, SW SW SW 5-34n-46w; TD 1,806 ft.; suspended indefinitely.

NORTH DAKOTA WILDCAT FAILURES

Emmons County: Roeser & Pendleton et al 1 Weber, NE NE SE 35-133n-76w; TD 5,556 ft.; abandoned.
Kidder County: Magnolia Petroleum Co. 1 State "A,44 C SE NE 36-141n-73w; TD 5,610 ft.; abandoned.

Eastern Texas

Drill-Stem Tests Show Oil in Grayson County Wildcat

DALLAS. — Drill-stem tests have recovered oil at a Grayson County wildcat 3 miles southwest of Hagerman. The Pennsylvanian prospect, George W. Humphrey's 1 Barnes Heirs, William Allen Survey, is about 2 miles east of Howell & Howell's Ellenburger discovery.

First reported test of the section, from 3,501-52 ft., recovered 1,245 ft. of oil in 2½ hours. Flowing pressure was 450 psi. Second test from 3,604-10 ft., open 3 hours, returned 1,350 ft. of gas in the pipe and 110 ft. of oil and gas-cut mud. Operators were drilling ahead below 3,865 ft. in shale and sand with no additional shows reported.

West of the 1 Barnes and east of Sandusky field, H. F. Gibson 1 Webb, McLeod Survey, had corrected its pay section from Ellenburger to the Oil Creek sand and as such probably will be classified as a long extension to the field.

Potential test of the well, through 14/64-in. choke from pay at 7,563-7,603 ft., gaged 164 bbl. of 44°-gravity oil in 10 hours. Gas-oil ratio was 950 cu. ft. per barrel, and flowing tubing pressure ranged from 1,325-1,775 psi.

Mid-Continent Petroleum Corp. and Skelly Oil Co. 1-D Chiles, wildcat northwest of Pottsboro, was drilling shale and lime at 6,121 ft.

A new 8,000-ft. wildcat for Grayson County has been staked by Lyons, Prentiss & McCord as the 1 Brown, in E. Hartzog Survey. Drill site is about 1 mile northeast of The Texas Co.'s original Ellenburger discovery in the area.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Wood County: J. M. Deupree & Morris Palmer 1 Slayton, S. Holman Sur., 2 mi. SE Pine Mills, TD 6,115 ft., PB 5,150 ft., elev. 429 ft., sub-Clarksville 4,995 ft., perf. 4,994-5,004 ft., pumped 310 bbl. 28.5°-gravity oil a day.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Falls County: J. E. Banks 1 Karl Keer, Basquez Sur., dry, TD 1,210 ft.
N. L. Barrett 1 Earl Scott, A. Montgomery Sur., dry, TD 1,040 ft.
W. A. Brain and Claud Litteral 1 Fairey Masters, S. W. Jordan Sur., dry, TD 1,235 ft.
Prime Petroleum Co. 1 Casey, J. G. W. Pierce Sur., dry, TD 1,310 ft.
Morris County: McDaniel & Born 1 G. L.

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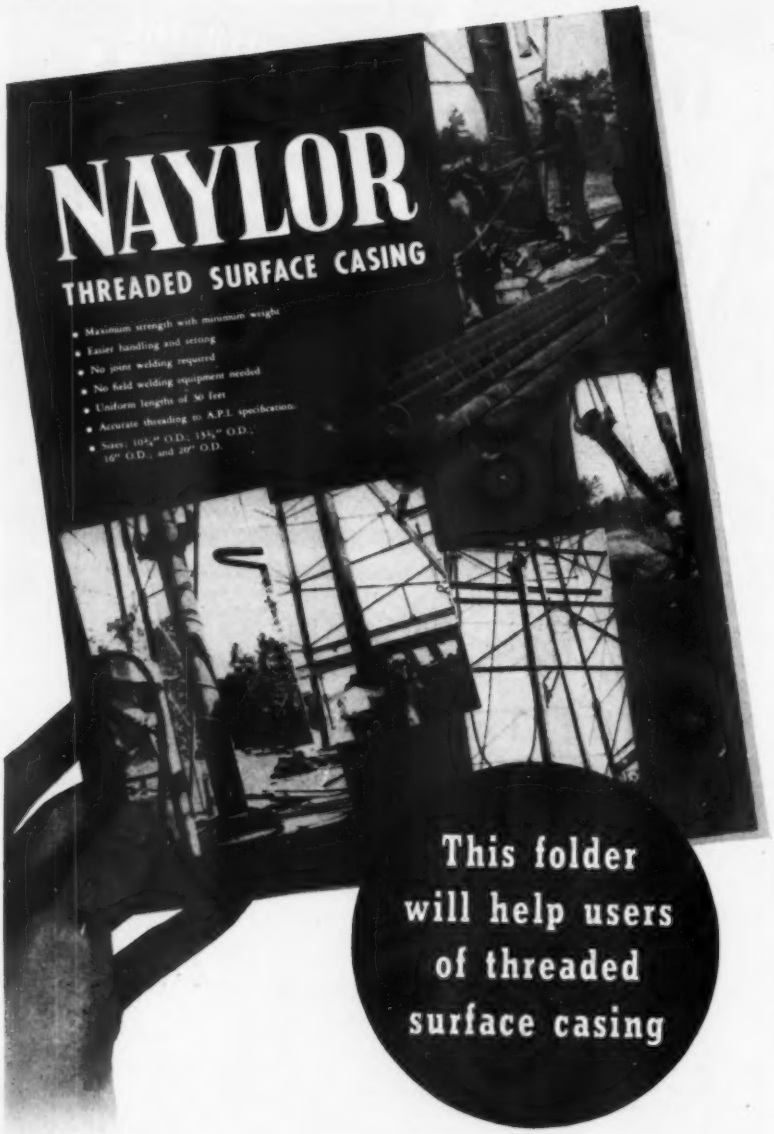
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May, J. Barefoot Sur., 1 mi. W Omaha, dry, TD 5,335 ft., elev. 406 ft., Georgetown 4,154 ft., Paluxy 5,244 ft.

Southwest Texas

Deep Production Opened In San Patricio County

CORPUS CHRISTI.—The deepest production to date is being opened in Triple A field, San Patricio County, at J. S. & R. H. Abercrombie and Atlantic Refining Co. 2 A. E. Nelson. The well flowed gas at the rate of 1,115,000 cu. ft. per day, plus 50 bbl. of condensate, through 9/64-in. choke on production test The hole was drilled to a total depth of 9,287 ft. and electrical log and sidewall samples indicated several sands with good shows below present pay zones. Production was through perforations at 8,744-50 ft.

D. H. Byrd 1 M. Blakely, Guase area wildcat, Milam County, has set casing for test of Edwards lime and lower Georgetown lime. Total depth is 5,736 ft. Good recoveries of oil were reported on a series of drill-stem tests run in these sections. This prospective discovery is in W. D. Thompson Survey, Green Tract.

Lone Star Production Co. 2 Sarah E. Ferry, second test in the new "Courhran" area of Atascosa County, is coring ahead below 8,179 ft. in Edwards lime after recovering oil and condensate on drill-stem test at 8,139-79 ft. Using ¼-in. chokes, the well had gas to surface in 15 minutes and recovered 540 ft. of mud cut with oil and condensate. Bottom-hole flowing pressure was 570 psi. and 3,680 psi. shut in.

Deep oil pay has been opened in Midway field, San Patricio County, at F. M. Boykin, Jr., A-1 A. W. Scrivner, G. H. Paul Subdivision of Coleman-Fulton Pasture Co. lands. Operator is now running electric log to 8,420 ft. after coring gas at 6,540-6,610 ft. and recovering 1,100 ft. of oil on drill-stem test at 6,615-21 ft.

Midstates Oil Corp. 1 J. W. Talley, southeast outpost at Pearsall field, Frio County, is preparing to acidize for open hole completion in Austin chalk at 5,517-5,700 ft. The chalk was topped at 5,510 ft. and operators set 7-in. casing at 5,517 ft. before drilling into the section. The well is in A. Lynch Survey, 7 miles southwest of Pearsall.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: Oil discovery, "Pruitt"—Humble Oil & Refining Co. C-1 E. J. Pruitt, Fabrious Reynolds Sur. 51, A-719, TD 5,066 ft., open hole 4,930-64 ft. (Navarro), IP: 12 bbl. oil per day on pump, 38.2° gravity.

Bastrop County: Oil discovery, (No. Cedar Creek)—John H. Foster 1 Mrs. Bessie Graham, J. A. Navarro Sur., TD 1,607 ft., open hole (Serpentine) 1,570-1,607 ft., IP: 110 bbl. oil per day on pump.

Wilson County: Oil discovery—H. J. Mosser et al. 1 Clarabel DeWess Remschel, Manuel Barrera Grant, A-4, TD 8,050 ft., perf. Buda lime 7,715-7,805 ft., IP: 560 bbl. oil per day, 30° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: Catre Research, Ltd., 1 Chas. Simmang Heirs, C. Simmang Sur., A-1,680, dry, TD 2,010 ft.

San Patricio County: Kirkwood & Co. and F. P. Zoch, Jr., et al, 1 Hal Parks, Lot 4, Sec. 6, First Subd. of Taft Farm Lands, dry, TD 8,015 ft.

Plymouth Oil Co. 1 Gussie Ragsdale, J. N. Seguin Sur., A-247, 6 mi. SW of Taft, dry, TD 10,214 ft.

Starr County: Bass-Vessels 1 Yturria Land & Livestock Co., Porcion 100, 2 mi. E of Davenport field, dry, TD 6,506 ft.

W. E. Field 1 Isidro Gonzales, Block 2, Share 41-A, Jose Antonio de la Garba Falcon Porcion 80, dry, TD 2,002 ft.

Permian Basin

Flush Production Found Between Canyon Reef Fields

MIDLAND.—Flush production from the Canyon reef limestone has been found between the Reinecke and Von Roeder fields by Shell Oil Co. 2 Sterling in 70-25-H&TC. Dry holes between the new well and the two producing areas may bring out a new reef structure.

Top of the reef was 6,000 ft., and minus 4,368 ft. is high to both areas. Drill-stem test from 6,605-40 ft., open 1 hour and 12 minutes, had gas in 2 minutes, mud in 10, and oil in 12. It was turned into tanks and in 1 hour gaged 122.5 bbl. of oil with no formation water.

The flow was through 1-in. top and bottom openings on tubing. The flow, by 15-minute stages, was 27, 29, 33.5, and 33 bbl. Fluid in the pipe was reversed out.

Northeast of Gail, Stanolind Oil & Gas Co. 1 R. C. Miller recovered 60 ft. of oil and gas-cut mud, along with water blanket, on a 2-hour test in the Ellenburger from 8,658-89 ft. The testing tool was said to have been partially closed. Operators were waiting on orders. The well had previously recovered oil on tests of the Spraberry and Canyon sections and had some oil in the Mississippian.

Extension wells and extensions to extensions, even before the first is finaled, have been reported with regularity from the Spraberry fields of Midland County. On the north side of Tex Harvey field, E. E. Fogelson and Edwin W. Pauley 1-43 Boone rated a calculated daily potential of 656 bbl. of oil from pay at 6,970-7,040 ft. That figure was based on a 6-hour flow of 164 bbl. of oil through 32/64-in. choke. The well was 1½ miles from nearest production.

El Capitan Oil Co. 1 Paul K. Jones, ¾-mile southeast offset to a recent 1½-mile stepout on the southeast side of Tex Harvey field, swabbed 251 bbl. of oil in 24 hours and prepared to retreat from 7,005-57 ft. with Hydrafrac.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCAT

King County: Ohio Oil Co. 1-D W. R. Ross, 134-A-J. B. Rector Sur., 7 mi. E Guthrie, TD 5,402 ft., elev. 1,708 ft., perf. 5,320-32 ft., pumped 114 bbl. 37°-gravity oil.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Concho County: Progress Petroleum Co. 1 Ed Speck, Sec. 1, BS&F Sur., dry, TD 3,702 ft., elev. 1,954 ft., Ranger 2,750 ft., Strawn 3,345 ft., Caddo 3,593 ft.

Crockett County: Joe T. Davidson 2 George Bean, 26-UV-GC&SF, dry, TD 1,480 ft.

Delta Gulf Drilling Co. 1 Dock Lee, J. H. Gibson Sur., 22 mi. SW Ozona, dry, TD 10,986 ft., elev. 2,483 ft., Devonian 9,303 ft., Ellenburger 10,885 ft.

Garza County: Murchison & Brown 1 Morris Neff, 90-5-GH&H, dry, TD 4,736 ft., elev. 2,504 ft., San Andres 2,273 ft.

Paul C. Teas 1 J. S. Edwards, 10-2-T&NO, dry, TD 4,015 ft., elev. 2,603 ft., San Andres 2,565 ft., Clear Fork 3,860 ft.

Glasscock County: Callery & Hurt 1 Winnie Powell Cooper, 36-35-2S-T&P, dry, TD 7,852 ft., elev. 2,519 ft., Spraberry 6,280 ft., Dean 7,592 ft.

Howard County: Texas Gulf Production Co. 1 TXL, 45-30-1S-T&P, 2 mi. S Snyder field, dry, TD 4,043 ft.

Kent County: William Herbert Hunt Trust 2 Girard Trust, 72-1-H&GN, dry, TD 6,910 ft.

King County: Humble Oil & Refining Co. 1-B Masterson, 10-A-R. M. Thompson Sur., dry, TD 6,575 ft., elev. 1,753 ft., Cisco 3,404 ft., Canyon 4,062 ft., Strawn 5,475 ft., Ellenburger 6,524 ft.

Kingwood Oil Co. 1 W. R. Ross, 88-A-R. M. Thompson Sur., dry, TD 5,390 ft., elev. 1,673 ft., Strawn reef 5,322 ft.

Norwood Drilling Co. 1 W. R. Ross, 47-A-J. B. Rector Sur., 12 mi. NE Guthrie, dry, TD 5,755 ft.

Loving County: H. H. Taylor 1 Young Bell, 20-54-T2-T&P, dry, TD 4,391 ft., elev. 2,888 ft., Delaware lime 4,317 ft., sand 4,344 ft.

Schleicher County: Placid Oil Co. 1 E. M. Jackson, 67-K-GH&SA, 9 mi. SE Eldorado, dry, TD 6,553 ft., elev. 2,333 ft., Canyon 4,902 ft., Strawn 5,495 ft., Ellenburger 6,449 ft.

Sterling County: Parochial Petroleum Co. 1 O. O. Myer, 4-T-T&P, dry, TD 1,521 ft., elev. 2,396 ft., San Andres 1,433 ft.

Tri-Service Drilling So. 1 T. H. Humble, 16-11-SPRR, dry, TD 1,450 ft., elev. 2,214 ft., San Andres 1,035 ft., Clear Fork 1,360 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURE

Donley County: T. A. Kirk 1 Eichelberger, 4-G-I&GN, 9 mi. N Clarendon, dry, TD 3,505 ft., elev. 2,852 ft., reported very light show of oil.

SOUTHEAST NEW MEXICO

HOBBS.—In southeastern Roosevelt County, Magnolia Petroleum Co. 1 J. S. Brown had flowing production from a sand stringer identified as the Permo-Pennsylvanian. Drill-stem test from 8,088-8,142 ft. had gas in 4½ minutes and oil in 20 minutes. It flowed into pits for 40 minutes and then gaged 112 bbl. of 45°-gravity oil in 2 hours. Gas-oil ratio was 1,216 cu. ft. per barrel, and bottom-hole flowing pressure was 1,975 psi. Recovery was reversed out. Operator was to core ahead.

In Lea County, H. S. Moss 1 State, 32-11s-33e, was drilling below 10,705 ft. in lime. Drill-stem test at 10,000-90 ft. recovered gas-cut mud with no oil shows and a later one from 9,910-10,001 ft. recovered salt water.

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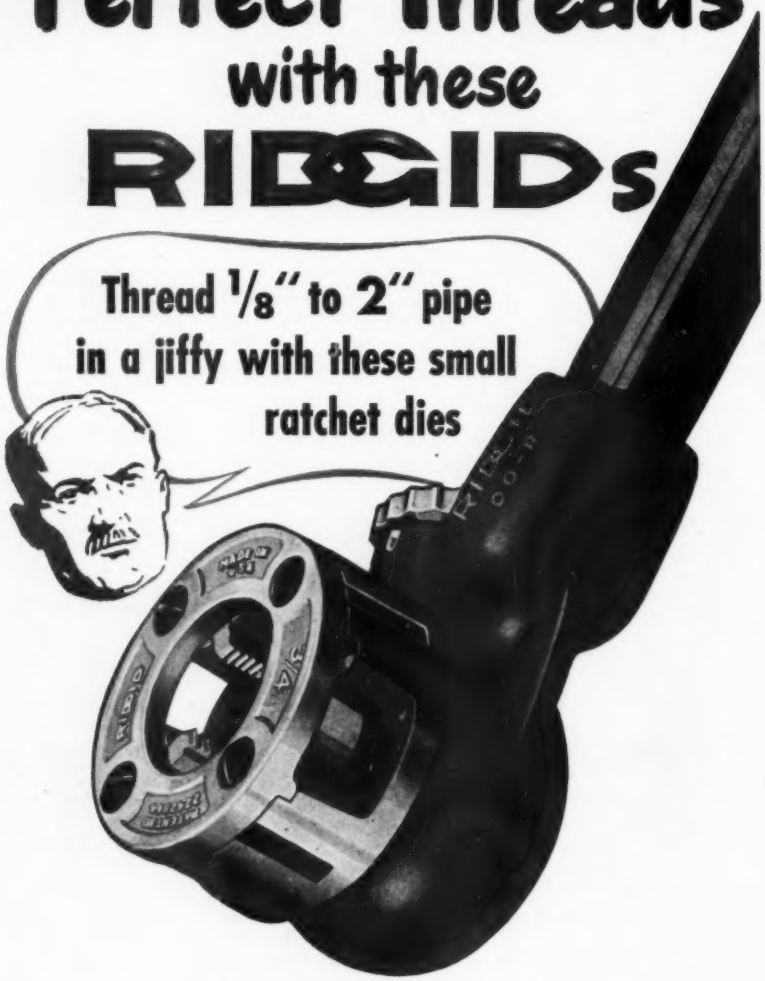

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Sharples Oil Co. 1 Seth Alston, 17-13s-28e, tested 30,000 cu. ft. of gas a day and recovered 684 ft. of oil and gas-cut mud, on a drill-stem test at 11,163-303 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Eddy County: Martin Yates, Jr. 2 Featherstone-State, 32-19s-27e, dry, TD 1,913 ft., elev. 3,335 ft., sand 715 ft., San Andres 1,675 ft.

Lea County: The Texas Co. 1-AP State, 20-11s-38e, dry, TD 10,336 ft., elev. 3,988 ft., San Andres 4,383 ft., Glorietta 5,840 ft., Tubb 7,045 ft., Abo 7,790 ft., Wolfcamp 9,200 ft.

Kansas

Meade County Wildcat Flows Oil During Test

COLUMBIAN FUEL CORP. and Helmerich & Payne, Inc., have a prospective oil producer in their 1 Adams, SW NE NW 25-34-30, a wildcat located about a mile north of the East Adams Ranch gas field, southwestern Meade County, in the southwestern part of the state.

The well had substantial oil saturation and showings in the Marmaton zone (middle Pennsylvanian), where, in a drill-stem test of an interval at 5,345-52 ft., it flowed by heads at an estimated rate of 10 bbl. per hour. Oil was at the surface in 28 minutes after the tester was open and the flow continued the remaining 22 minutes of the test. Gas production was estimated at 350,000 cu. ft. per day, with gas showing at the top within 5 minutes. Operators, at latest report, were coring ahead.

Gas production in the East Adams Ranch field is from the lower Pennsylvanian Morrow section. The new discovery is about 5 miles east of a small wildcat oil well completed by Columbian Fuel Corp. 2 weeks ago at 1 Novinger, C NW NW 26-33-30, also in Meade County. That well pumped 66 bbl. of oil daily from pay at 5,803-32 ft. and 5,817-32 ft.

Promising oil showings also have been obtained in the Marmaton zone in another western Kansas wildcat. It is Willis L. Hartman 1 Damme, SE SE NW 21-22-23, in northwestern Finney County. Top of the zone was logged at 4,300 ft. (—1,404 ft.). Eight feet of slightly oil-cut mud was recovered in a 30-minute drill-stem test at 4,355-65 ft.; 10 ft. of slightly oil-cut mud in a 30-minute test at 4,381-4,402 ft.; 93 ft. of slightly oil-cut mud in a 60-minute test at 4,406-17 ft.; and 1,240 ft. of gas and 496 ft. of clean oil in a 10-minute test at 4,417-30 ft. Location is 3 miles east of gas production at the north end of the Hugoton area, and about 7 miles southeast of the Nunn pool, which also produces from the Marmaton, as well as the Cherokee and Mississippian.

KANSAS SUCCESSFUL WILDCATS

Barber County: Parker 1 Alexander, C SE NE 6-33s-12w, flowed 12,500,000 cu. ft. of gas from Douglas sand at 3,8886-3,905 ft., TD; elev. 1,682 ft.

Butler County: Rex & Morris 1 Johnson, SE SE NW 29-25s-4e, pumped 35 bbl. oil per day from Viola at 2,700-02 ft., TD; Mississippi lime 2,535 ft., elev. 1,352 ft.

Ellsworth County: New pay in Mathews—Imperial 2 Mathews, SW SE NW 19-17s-10w, pumped 389 bbl. oil per day from Arbuckle at 3,284-3,305 ft., TD; anhydrite 645 ft., Topeka 2,736 ft., Heebner 2,854 ft., Lansing-Kansas City 2,978 ft., Sooy 3,254 ft., elev. 1,824 ft.

Hodgeman County: Diegel 1 Schraeder, NW SE NW 3-24s-24w, 1,549 bbl. oil per day from Mississippi lime at 4,665-83 ft., TD; Heebner 3,932 ft., Lansing-Kansas City 4,010 ft., Sooy 4,634 ft., elev. 2,478 ft.

Rooks County: New pool, NW Berland—Barnett 1 Coddington, SE SE SE 2-10s-20w, pumped 122 bbl. oil per day from Arbuckle at 3,783-89 ft., TD; anhydrite

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1,662 ft., Topeka 3,242 ft., Heebner 3,446 ft., Lansing-Kansas City 3,483 ft., elev. 2,215 ft.

Saline County: Ostenberg 1 Ostenberg, SE NE SW 30-15s-3w, pumped 571 bbl. oil per day from Maquoketa dolomite at 3,406-10 ft., TD; Mississippi lime 2,862 ft., Kinderhook 3,160 ft., Misener 3,316 ft., Hunton dolomite 3,320 ft., Maquoketa shale 3,342 ft., elev. 1,289 ft.

Stafford County: New pay in Duggan—North American 1 Hullman, SW SW SE 30-21s-11w, pumped 282 bbl. oil per day from Simpson sand at 3,506-14 ft., TD; Heebner 3,030 ft., Lansing-Kansas City 3,180 ft., Sooy 3,450 ft., Simpson shale 3,486 ft., elev. 1,767 ft.

New pool: Bart-Staff—Palmer 1 Boyd, NW NW NW 4-21s-14w, pumped 1,192 bbl. oil per day from Arbuckle at 3,572-77 ft., TD; Heebner 3,184 ft., Lansing-Kansas City 3,294 ft., elev. 1,912 ft.

New pay in Leesburg—Continental 1 Russell, SE SE NW 13-25s-13w, pumped 65 bbl. oil per day from Simpson at 4,060-84 ft., TD 4,132 ft., OWWO, was Arbuckle producer; old tops: Lansing-Kansas City 3,565 ft., Sooy 3,880 ft., Viola 3,975 ft., Arbuckle 4,115 ft., elev. 1,918 ft.

Woodson County: Ashlock 1 Schelenger, SW SW SE 25-23s-14e, pumped 25 bbl. oil per day from Mississippi lime at 1,608-ft., ft., TD.

KANSAS WILDCAT FAILURES

Barton County: Coop Refining et al 1 Czermack "A," NW NW NE 24-17s-13w, dry, TD 3,386 ft., Heebner 3,002 ft., Toronto 3,020 ft., Lansing-Kansas City 3,112 ft., Sooy 3,344 ft., Arbuckle 3,357 ft., elev. 1,838 ft.

Lindas 1 Marquis, NE NE SW 4-17s-14w, dry, TD 3,504 ft., anhydrite 965 ft., Heebner 3,156 ft., Dodge 3,172 ft., Lansing-Kansas City 3,225 ft., Sooy 3,444 ft., Arbuckle 3,491 ft., elev. 1,978 ft.

Aledo-Murfin 1 Wondra, SW SW NE 15-17s-12w, dry, TD 3,335 ft., Heebner 2,941 ft., Lansing 3,047 ft., Arbuckle 3,321 ft., elev. 1,832 ft.

Butler County: Davis 1 Henshaw, NE SW NE 32-27s-3e, dry, TD 3,078 ft., Mississippi lime 2,774 ft., Kinderhook 2,984 ft., Simpson 3,032 ft., elev. 1,267 ft.

Edwards County: Morrison Drilling et al 1 Fisher, SW SW NW 27-24s-16w, dry, TD 4,727 ft., Topeka 3,346 (?) ft., Heebner 3,691 ft., Dodge 3,722 ft., Lansing-Kansas City 3,946 ft., Sooy 4,270 (?) ft., Mississippi chat 4,280 ft., Kinderhook 4,309 ft., Viola 4,404 ft., Simpson 4,598 ft., Arbuckle 4,672 ft., elev. 2,075 ft.

Graham County: Jones-Shelburne & Farmer 1 Eichman, NW NW NW 32-9s-21w, dry, TD 3,992 ft., anhydrite 1,800 ft., Heebner 3,526 ft., Lansing-Kansas City 3,563 ft., Sooy 3,922 ft. ,elev. 2,315 ft.

Gore 1 Walker, NE NE NE 14-10s-23w, dry, TD 4,284 ft., anhydrite 1,950 ft., Topeka 3,463 ft., Heebner 3,681 ft., Lansing-Kansas City 3,717 ft., Arbuckle 4,254 ft., elev. 2,392 ft.

Harvey County: Francis Oil & Gas 1 Regier, SW SW SW 12-22s-3w, dry, TD 3,820 ft., anhydrite 1,452 ft., Heebner 2,213 ft., Lansing-Kansas City 2,461 ft., Mississippi lime 3,176 ft., Hunton 3,558 ft., Viola 3,695 ft., Simpson 3,713 ft., Simpson dolomite 3,717 ft., Arbuckle 3,794 ft., elev. 1,452 ft.

Marion County: Aladdin 1 Fern, NW NE NW 36-22s-3e, dry, TD 3,057 ft., Lansing 1,944 ft., Kansas City 2,140 ft., Burgess 2,530 ft., Mississippi lime 2,551 ft., Kinderhook 2,710 ft., Hunton 2,819 ft., Maquoketa 2,867 ft., Viola 2,885 ft., Simpson sand 2,967 ft., Arbuckle 3,030 ft., elev. 1,421 ft.

McPherson County: Derby-Carey 1 Bruce, NE NE NW 36-17s-2w, dry, TD 2,780 ft., Mississippi dolomite 2,736 ft., Maquoketa 2,738 ft., elev. 1,375 ft.

Barbara Oil et al 1 Klinkerman, NE NE NE 36-18s-2w, dry, TD 3,662 ft., Lansing-Kansas City 2,352 ft., Mississippi lime 2,966 ft., Viola 3,486 ft., Simpson 3,546 ft., Arbuckle 3,631 ft., elev. 1,561 ft.

Phillips County: Black Cat 1 Seyler, SW SW SW 9-1s-18w, dry, TD 3,530 ft., Heebner 3,278 ft., Kansas City 3,307 ft., elev 2,119 ft.

Reno County: Francis Oil & Gas 1 Keim, SE SE NW 35-24s-5w, dry, TD 3,950 ft., Lansing-Kansas City 2,692 ft., Mississippi lime 3,392 ft., Kinderhook 3,596 ft., Misener 3,733 ft., Maquoketa 3,734 ft., Viola 3,822 ft., Simpson shale 3,837 ft., Simpson sand 3,840 ft., Arbuckle 3,928 ft., elev. 1,512 ft.

Rooks County: M & L 1 Weisner, SW SW NE 26-10s-18w, dry, TD 3,715 ft., anhydrite 1,455 ft., Topeka 3,075 ft., Toronto 3,341 ft., Heebner 3,322 ft., Lansing-Kansas City 3,365 ft., Sooy 3,663 ft., elev. 2,106 ft.

Aylward 1 Mayhew, NE NE SW 1-10s-19w, dry, TD 3,746 ft., Topeka 3,154 ft., Heebner 3,370 ft., Lansing-Kansas City 3,412 ft., Marmaton 3,630 ft., Sooy 3,719 ft., elev. 2,185 ft.

Westgate-Greenland 1 Sutor, SW SW SW 35-10s-19w, dry, TD 3,848 ft., anhydrite 1,653 ft., Heebner 3,435 ft., Toronto 3,455 ft., Lansing-Kansas City 3,475 ft., Sooy 3,738 ft., Simpson dolomite 3,785 ft., Arbuckle 3,794 ft., elev. 2,218 ft.

Russell County: Duke & Wood 1 Kampl, SW NW SE 27-14s-12w, dry, TD 3,177 ft., anhydrite 567 ft., Heebner 2,730 ft., Kansas City 2,818 ft., Arbuckle 3,153 ft., elev. 1,657 ft.

EASTERN & SOUTH CENTRAL NEBRASKA WILDCAT FAILURES

Harlan County: National Associated Petroleum 1 School Land, SW SW SW 16-1n-19w, dry, TD 3,638 ft., Heebner 3,436 Ft., Lansing-Kansas City 3,465 ft., elev. 2,145 ft.

Richardson County: Stout Drilling 1 Maddox, SE SE SE 9-2n-16e, dry, TD 2,451 ft., Mississippi lime 2,058 ft., Hunton 2,397 ft., elev. 1,025 ft.

South Louisiana

Oil Production Confirmed in South Bayou Mallet Field

NEW ORLEANS. — Oil production has been confirmed in South Bayou Mallet field, Acadia Parish, at Bates & Cornell 2 August Leonards, 29-7s-1e. Through casing perforations at 9,957-66 ft. and 9,970-75 ft., the well flowed 225 bbl. of 43.4°-gravity oil daily through 10/64-in. choke. Hole is bottomed at 10,083 ft. with 5-in. liner cemented at 10,076 ft. Working from an elevation of 59 ft., the following sands were indicated by electrical survey: 9,250-58; 9,284-94; 9,433-53; 9,488-503; 9,555-65; and 9,957-10,070 ft.

South Bayou Mallet field was discovered in December 1950, at the same operator's 1 August Leonards, C NE NE SE 29-7s-1e, which was completed for 330 bbl. of oil per day through perforations at 9,953-69 ft.

The Texas Co. has confirmed gas-distillate production in the Sherburne field, Pointe Coupee Parish, at 2 V. J. Kurzweb, et al, 38-6s-7e, Through perforations at 10,300-20 ft., the well flowed 4,908,000 cu. ft. of gas daily plus 246 bbl. of 50.1°-gravity distillate through 14/64-in. choke.

Fidelity Oil & Supply Co. is moving in rig for its third effort in the new Cowpen Creek field, Beauregard Parish. The venture has been designated as 3 Edgewood Land & Logging Co., 18-6s-9w. It is 1,320 ft. south of the field discovery, same operator's 1 Edgewood Land & Logging Co. Fidelity failed to find production in its second try, 2 Edgewood Land & Logging Co., which was abandoned last week at total depth of 9,100 ft.

In Weeks Island field, Iberia Parish, Shell Oil Co. 1 H. T. Gonsoulin, 41-14s-7e, is still fishing at 15,641 ft. This well promises to be the deepest producer in the Gulf Coast area.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Bateman Drilling Co. 1 Dr. F. M. Hayes, 44-7s-1w, dry, TD 9,730 ft.

Terrebonne Parish: Humble Oil & Refining Co. 1 State Lease 1,869, Four League Bay, 32-20s-13e, dry, TD 14,395 ft.

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Bill Tobias, driller (standing) and George Ballow, tool pusher (seated) are shown with a **REED** TST-1 Rock Bit. This bit is noted for fast drilling of the softer Kansas formations.

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Michigan

Oceana County Discovery Pumps 185 Bbl. Clean Oil

MOUNT PLEASANT.—First 24-hour pumping test at Gulf Refining Co. 1 Ruckel, NE SW NW 18-14n18w, Shelby field discovery well, Benona Township, Oceana County, yielded 185 bbl. of oil and no water. This new discovery will be pumped for potential tests for 3 or 4 days and then restricted to about 100 bbl. of oil a day. The discovery well is being produced from the Traverse at 1,760 ft., plug-back depth after top of lime was logged at 1,732 ft. Well was acidized with 500 gal. Producing zone is the so-called lower Traverse, Stony Lake pay zone.

Gulf had Traverse top objective at the 1 Drur, SW NE NW 18-14n-18w, the south 20-acre offset to the 1 Ruckel discovery. The Traverse was checked in about 12 ft. low on this first Shelby field follow-up test. The Traverse was cored from 1,727-49 ft. Long string of 5-in. casing was run and cemented at 1,738 ft. Core showed a top Traverse pay at 1,737-40 ft. and 1,746-49 ft.

Two offset locations are being staked in Sherman Township, Oceana County, offsetting Mogul Oil Co. 1 Hammar, SW SW NE 20-20n-9w, possible new Dundee oil discovery well. Tests at the 1 Hammar have not been completed. Top of Dundee dolomite was logged at 3,861 ft. in this well, and oil and gas showed on a drill-stem test of a pay logged at 3,862-70 ft. Mogul was clearing location for the diagonal southwest offset to the 1 Hammar, in the NE NE SW 20-20n-9w, and Rex Oil & Gas Co. was clearing location for the north offset, in the NE SE NW 20-20n-9w.

LEGAL

Notice is hereby given that SEALED BIDS will be received until 2:00 p. m. May 3, 1951, and opened at that time in the Office of the Superintendent of the Wind River Indian Agency, Fort Washakie, Wyoming, for the leasing of the following units of tribal land located in Fremont County, Wyoming, for oil and gas mining purposes. UNIT NO. 1: E½ of Sec. 32, W½ of Sec. 33, Twp. 1 S, R. 5 E, W.R.M. containing 640 acres. UNIT NO. 2: NE¼ NE¼ SE¼, Sec. 5, W½ of Sec. 4, Lots 3 & 4, Sec. 9, Twp. 2 S, R. 5 E, W.R.M. containing 637.45 acres. The foregoing units of tribal land is being offered, and a lease will be drawn on the applicable Government form. The right is reserved to reject any and all bids. The successful bidder will be required to pay the cost of advertising. The lessee must pay as advance rental $1.25 per acre per annum. The lease will be sold to the highest bidder for a bonus offer upon an **acreage basis** in addition to the royalty of 12½%. The successful bidder must deposit with the Superintendent of the Wind River Indian Agency, on the date of the sale, a certified check or bank draft on a solvent bank in an amount equal to 20% of the bonus bid and of the first year's rental, as a guaranty of good faith. The check is to be made payable to the TREASURER OF THE UNITED STATES. The lease must be completed and filed with the Superintendent within 20 days from the date it is received by the lessee for execution and returned with the remainder of the bonus bid, the balance of the first year's rental, a filing fee of $10.00, and the cost of the printed forms. Failure in any of these conditions may subject the bid to cancellation without further notice and forfeiture of payments already made. The lease on the above tribal unit will be drawn pursuant to the Act of May 11, 1938 (52 Stat. 347) and the regulations, Part 186, Title 25, C.F.R. The lease issued pursuant to this notice will be made for a term of ten years from the date of approval by the Commissioner of Indian Affairs and as long thereafter as oil and/or gas is produced in paying quantities. The rate of royalty will be 12½% of the value of all oil, gas, and/or natural gasoline, unless the lessor, with the approval of the Commissioner of Indian Affairs, elects to take royalty in kind. The adequacy of the bonus offer will be determined by the U. S. Geological Survey. A suitable bond will be required, and such bond must be aproved by the Commissioner of Indian Affairs. The responsibility of complying with any requirements of the Federal Documentary Stamp Statutes will be left with the successful lessee. All bids should be addressed to the "Superintendent, Wind River Indian Agency, Fort Washakie, Wyoming" in a plain envelope marked: BID FOR OIL AND GAS MINING LEASE, RIVERTON DOME, TO BE OPENED AT 2:00 P. M. May 3, 1951. For further information call or write Lands Department of the Wind River Agency Lynn W. Jenkins, Land Officer. Approved: W. W. Palmer, Superintendent.

MICHIGAN WILDCAT FAILURES

Allegan County, Allegan Township: Sheldon-Stewart Co. 1 Reuhle, SW SW SW 13-2n-13w, Traverse 1,506 ft., dry, TD 1,509 ft.

Ganges Township: Fisher-McCall Oil & Gas, Inc., 1 Madwjczyk, NE NW NE 36-2n-16w, Traverse 1,202 ft., dry, TD 1,252 ft.

Saugatuck Township: W. C. Vandenberg, Jr., 1 Race, NW NW NW 36-3n-16w, Traverse 1,350 ft., dry, TD 1,383 ft.

Valley Township: Rex Oil & Gas Co. 1 Morris, NE NW SE 1-2n-14w, Traverse 1,488 ft., dry, TD 1,523 ft.

Ionia County, North Plains Township: Harley Ferrell 1 Thomas & Marion, NE SE NE 10-8n-5w, Dundee 2,980 ft., dry, TD 3,102 ft.

Isabella County, Rolland Township: McClure Oil Co. 1 Comstock, SW SW SW 27-13n-6w, Marshall 1,293 ft., dry, TD 1,396 ft.

Kalkaska County: Kalkaska Township: Mogul Oil Co. A-1 State-Kalkaska, NW SW SW 2-27n-7w, dry in Richfield, TD 3,858 ft.

Kent County, Wyoming Township: Universal Drilling Co. 1 Kaat, SE NE SW 35-6n-12w, Traverse 1,860 ft., dry, TD 1,900 ft.

Lake County, Ellsworth Township: Harry Roberts 1 State-Ellsworth, NE SE SW 34-19n-11w, Dundee 3,602 ft., dry, TD 3,805 ft.

Montcalm County, Richland Township: Leslie T. Barber 1 Nelson et al., NW NE NE 5-12n-5w, Michigan stray sand 1,271 ft., dry, TD 1,277 ft.

Appalachian-Ohio

One Good Gas Well In Slack Week

PITTSBURGH.—In Clear Fork district, Wyoming County, West Virginia, a good shallow sand gas well was brought in. United Producing Co., Inc., 102-1741 W. M. Ritter Lumber Co. gaged 1,380,000 cu. ft. of gas from the Berea sand. Total depth was 3,680 ft.

No completions or new locations were reported in the Leidy Township, Clinton County, field in north central Pennsylvania.

Maryland.—Eberly & Snee were acidizing 1 Virginia E. Baker; the depth of the well is 3,694 ft. The following wells are drilling: Columbian Carbon Co. 1-GW-1505 William R. Offutt, 1,466 ft.; Eberly Sneel 1 R. L. Gilbert, 4,165 ft.; Eberly & Snee, 1 Floyd Artes, 820 ft.; Blaho Oil & Gas Co. 1 Kite, 2,910 ft.; Eagle Oil & Gas Co. 1 Emil Germain, 425 ft.; Union Drilling Co. 1 Simon Cogley, 2,405 ft.; Delaware Gas Co. 1 Holloway (Lot), 1,880 ft.; Huntley & Huntley 1 Earl Hershman, 1,964 ft.; Shaw & Shaw 1 George Harvey (Lot), 2,746 ft.

OHIO

COLUMBUS.—John Galey et al. have put a rig over an old abandoned Newburg sand dry hole on W. B. Hoare in Lot 23, Shalesville Township, Portage County, and will drill on down to test the Clinton. The well is 4 miles east of a Clinton dry hole.

Mid-Atlantic Co. has extended Berea pool in Washington Township, Tuscarawas County, ½ mile to the north. The well, 2 W. H. Hunt, Lot 5, gaged 550,000 cu. ft. of gas, natural, from the lower Berea at 1,000-09 ft.

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Canadian Fields

Gas and Oil Prospects Pace Week's Activity

CALGARY. — Great Plains Development Co. of Canada, Ltd., found gas plus some oil on its first drill-stem test in the Lower Cretaceous at its 6-36 Okanagan-Chelan in the Drumheller area. The test through ½-in. choke, was made at 4,432-49 ft., and natural gas flowed to the surface in 3 minutes, rating 686,000 cu. ft. daily. When pipe was pulled there was a recovery of 66 ft. of 35°-gravity crude, no water.

There were approximately 60 ft. of D2 oil pay indicated at a well being drilled on the extreme southwest side of McLeod oil pool in southeast Leduc. Allenbee-Cardinal-Tri-West-Marlingor 5, LSD 16, 23-49-26w4, flowed oil during drill-stem test, and gave water-free oil in pipe recoveries. Results of three tests follow: 1-hour test from 5,210-56 ft., steady gas blow plus recovery of 120 ft. of gas-cut mud; from 5,258-98 ft., gas flow rate 700,000 cu. ft. daily, plus flow of oil in 44 minutes; from 5,296½-5,318 ft., maximum gas flow rate 196,000 cu. ft. daily, 1-hour pipe recovery 2,070 ft. of oil, no water.

Success was assured at another well in Joseph Lake Viking sand field, as oil flowed to the surface during drill-stem test recently. The new producer, owned by Superior-General-Kroy-Jupiter-Imperial, is that team's forty-fifth oil success in that field and a ¼-mile east extension. On test from 3,274-81 ft., it flowed natural gas in 3 minutes, at a 60,000-cu.-ft.-daily rate, and oil in 36 minutes. The well, Joseph Lake 50, is in LSD 7, 13-50-22w4.

Medicine Hat gas field got a 2-mile extension at Britalta-Deep Rock-Many Island 1, LSD 11, 23-13-4w4, which found the gas sand from 1,302-1,330 ft.

CANADIAN SUCCESSFUL WILDCAT

Delhi-Socony-Countess 1, LSD 7, 8-21-16w4, TD 3,871 ft., potential 2,600,000 cu. ft. gas daily from Bow Island sand.

CANADIAN WILDCAT FAILURES

Delhi-B.A.-Antelope Hills 1, LSD 11, 7-21-1w4, TD 4,200 ft.

C.P.R.L. Ellerslie 2, LSD 3, 6-52-24w4, TD 3,871 ft.

Shell-B.A.-Bingo Lake 1, LSD 2, 5-83-2w6, TD 7,977 ft.

Louisiana-Arkansas

Skelly Discovery Opens New Field

SHREVEPORT.—Discovery of a new field ¾ mile north of Fouke field in Miller County has been confirmed at Skelly Oil Co.'s 1 Heilbron. Located in C NW NW NE 28-16s-26w, the wildcat produces from a deeper zone than the two pay horizons at Fouke. On a 2-hour test, after well had been cleaned, it flowed at a rate of more than 798 bbl. of 44.6°-gravity oil per day from broken sand at 4,180-88 ft. Total depth is 4,281 ft. with 5½-in. casing set on bottom.

In LaSalle Parish, North Louisiana, Justiss-Mears Oil Co. has extended Nebo field to the west at its B-1 Ward et al., 13-7n-3e. The well pumped 69 bbl. of oil per day from perforations at 4,005-08 ft., with total depth at 4,201 ft.

A water injection program has been approved for Lisbon field (Claiborne and Lincoln parishes) to start May 1. Covering about 10,000 acres, this has been called the largest project of its kind. The Pettit lime section, which is to be water flooded, has already produced approximately 11,000,000 bbl. of oil, and it is estimated that an equal amount can be recovered through the program.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Lincoln Parish: New pay in Simsboro—C. H. Murphy Corp. and Pan-Am Southern Oil Co. 2 W. A. Givens, 1,522 ft. N and E SWc 2-17n-4w, 9,400,000 cu. ft. of gas from Fowler sand (Rodessa) at 5,330-50 ft. and Hill sand at 5,436-65 ft., TD 6,998 ft., base Annona 2,783 ft., Tokio 3,047 ft., Tuscaloosa 3,711 ft., Massive anhydrite 4,933 ft., base Massive anhydrite 5,160 ft., James 5,673 ft., Sligo 6,135 ft., Pettit 6,350 ft., Travis Peak 6,449 ft., Gardner 6,530 ft., elev. 370 ft.

NORTH LOUISIANA WILDCAT FAILURES

Catahoula Parish: Justiss-Mears Oil Co. and W. C. Nolen 1 Harmon, C NW SE 34-9n-7e, dry, TD 6,026 ft., Cockfield 1,109 ft., Sparta 1,967 ft., Cane River 2,868 ft., Wilcox 3,185 ft., base Big shale 6,004 ft., elev. 60 ft.

DeSoto Parish: J. F. Lent 1 Walker, 252 ft. S and 678 ft. W NEc SW 20-11n-13w, dry, TD 2,700 ft., Saratoga 1,360 ft., base Annona 1,725 ft., base Ozan 1,905 ft., Austin 2,590 ft., elev. 326 ft.

LaSalle Parish: J. S. Michael et al 2 Nebo Oil Co. "A," C SE NE 9-8n-2e, dry, TD 4,302 ft., no tops reported.

Red River Parish: Dr. E. C. Cook et al 1 J. F. Conley, 2,470 ft. N and 2,320 ft. E SWc 2-14n-10w, dry, TD 3,000 ft., no tops reported.

Winn Parish: Myers & Collins 1 J. A. McCartney, 1,624 ft. N and 2,225 ft. W SEc 16-11n-2w, dry, TD 1,313 ft., to tops reported.

ARKANSAS SUCCESSFUL WILDCAT

Miller County: Lee & Markham 1 Price, 150 ft. NE of C NE NW 18-16s-25w, pumped 15 bbl. of oil per day from Pa-

THE OIL AND GAS JOURNAL

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Petroleum Industry Consultants, C. A., Caracas, Venez.
Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.

luxy at 3,311-14 ft., TD 4,368 ft., Massive anhydrite 4,365 ft., elev. 240 ft.

ARKANSAS WILDCAT FAILURES

Chicot County: Jack Marvin et al 1 R. E. Cox, C NE NW NW 3-17s-1w, dry, TD 3,618 ft., no tops reported.

Columbia County: Arkansas Fuel Oil Co. 1 J. J. Glass, C SE NW 1-19s-23w, dry, TD 10,406 ft., Nacatoch 1,970 ft., Saratoga 2,344 ft., base Annona 2,678 ft., Tokio 3,048 ft., Tuscaloosa 3,434 ft., Paluxy 3,656 ft., Glen Rose 4,220 ft., anhydrite 4,493 ft., Massive anhydrite 4,668 ft., base Massive anhydrite 4,873 ft., James 5,413 ft., Sligo 5,798 ft., Travis Peak 5,964 ft., Cotton Valley 7,574 ft., Buckner 10,130 ft., Smackover 10,183 ft., elev. 263 ft.

Hempstead County: N. V. Kinsey 1 C. M. Miller, 989 ft. W and 400 ft. S NEc SE SE 33-10s-24w, dry, TD 1,933 ft., Saratoga 127 ft., Tokio 725 ft., Travis Peak 1,390 ft., Cotton Valley 1,870 ft., Eagle Mills 1,900 (?) ft., elev. 415 ft.

Union County: J. S. Beebe and Casey 1 Cates "A," C NW SE 33-18s-14w, dry, TD 4,005 ft., Arkadelphia 2,005 ft., Saratoga 2,094 ft., base Annona 2,498 ft., Graves 2,628 ft., Blossom 2,761 ft., James 3,131 ft., Hogg 3,321 ft., Travis Peak 3,499 (?) ft., elev. 205 ft.

Illinois-Ind.-Ky.

McLeansboro Area Test Flows 80 Bbl. Per Hour

STANFORD OIL CO.'s and George Schoonmaker's discovery well in the area 6 miles northeast of McLeansboro, Hamilton County, Illinois, is proving an exceptionally good producer. The well, 1 Thompson, SE NW SW 18-4s-7e, was brought in flowing at the rate of 80 bbl. of oil per hour (1,920 bbl. per day) natural, and at latest report still was producing between 45 and 50 bbl. of oil per hour. Production is from McClosky lime with hole open at 3,717-22 ft. The well is about a mile south of production at the southeast extremity of the Bell Prairie pool, and about 5 miles west of Blairsville production.

Another good discovery for the week is located in the bend of the Wabash River about 3 miles southeast of Keensburg, Wabash County, Illinois, where Charles White and associates 1 Arthur Garst, SE SE SW 27-2s-13w, swabbed at the rate of 50 bbl. of oil per hour in a short test before being shut in pending erection of storage. Pay zone at 2,403-16 ft. in Cypress sand was given a 60-qt. shot. The well is about ½ mile from a lone producer in another pay zone.

First oil production for Monroe County, Indiana, has been established where John I. Easter and J.B.L. Drilling Co. have placed their 1 Easter, NE SW SE 33-7n-1e, on the pump making between 8 and 9 bbl. of oil per hour. Production is from Trenton lime, topped at 1,720 ft. and open below 1,723 ft., where 7-in. casing had been run. Pay zone, treated with 600 gal. of acid, is given as 1,740-43 ft.

Production of the Zion pool, 7 miles east of Henderson, in Henderson County, western Kentucky, is being extended ¾ mile to the northeast where J. C. Ellis and associates are testing McClosky lime in their 1 Griffin, C SE NW 1-P-25. A previous drill-stem test of this zone at 2,227-42 ft. got a substantial showing of gas and recovered 240 ft. of clean oil and 200 ft. of oil-cut mud. The well also is a prospective producer in O'Hara lime, logged at 2,187-92 ft., where a drill-stem test got gas and yielded 120 ft. of oil and 150 ft. of heavily oil-cut mud. Casing was run through the latter zone, which will be tested later through perforations.

Don Baines has a new oil discovery at his 1 Stangle, SW SW SE 25-4n-10e, a mile northeast of Olney and south and east of production in the Olney pool, Richland County, Illinois, where casing has been run to test McClosky lime saturation at 3,144-62 ft. The well gassed in 44 minutes and yielded 120 ft. of clean oil and 80 ft. of oil and gas-cut mud in a drill-stem test of that zone.

ILLINOIS WILDCAT FAILURES

Clay County: Calvert Drilling, Inc., 1 Kemmerer, NE SE NW 34-4n-6e, dry, TD 2,616 ft.

Clinton County: T. Myers 1 Goldschmidt, NE SE NE 2-2n-4w, dry, TD 2,358 ft.

Coles County: E. Zink 1 Shoots, S½ SE NE NE 6-12n-11e, dry, TD 671 ft.

Edwards County: Indiana Farm Bureau 1 Tennis, SE NW SE 1-1s-14w, dry, TD 2,930 ft.

Richland County: Sun Drilling Co. 1 Pflaum, S½ NE NE SW 1-3n-9e, dry, TD 3,022 ft.

Shelby County: Elfred M. Branger 1 McDaniel, SE SW SE 17-13n-2e, dry, TD 2,600 ft.

INDIANA WILDCAT FAILURES

Boone County: William Moss 1 Little, NE NE SE 15-19n-2e, dry, TD 1,052 ft.

Daviess County: M.H.S. Associated 1 Zigler, SW NW SW 2-5n-5w, dry, TD 1,801 ft.

Gibson County: Circle Drilling Co. 1 McElliheney, NW NW SE 31-1s-9w, dry, TD 1,510 ft.

Knox County: George & Wrather 1 Alton, NEc SE SE N WProjected Section 31-1s-9w, (Militia Donation 44) dry, TD 1,775 ft.

La Grange County: J. W. Hunt 1 Segrist, NE NE NW 19-37n-11e, dry, TD 2,337 ft.

Martin County: F. Lyons 1 Haines, NW SE SE 34-4n-4w, dry, TD 2,807 ft.

Posey County: Illinois Mid-Continent Co. 1 Topper, SE SE NE 22-8s-14w, dry, TD 3,010 ft.

Sullivan County: A. S. Reed 1 Orr, NE SE NW 25-9n-10w, dry, TD 810 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: F. H. Rhodes 1 Gains, SWc SW NW NW 19-O-30, dry, TD 1,598 ft.

Grayson County: Winn-Pierce 1 Ellis Heaverin. NW SE NE SE 14-L-40, dry, TD 1,703 ft.

Henderson County: W. G. Reynolds et al., 1 Moss, NWc NW NW SE 18-P-25, dry, TD 2,402 ft.

Union County: John Buchman 1 Drury, SE NE NE 11-O-20, dry, TD 2,722 ft.

EASTERN KENTUCKY

ASHLAND.—In Big Sandy gas field, on Pine Fork in Pike County, United Fuel Gas Co. has completed 6609 Shelby Creek Coal Corp. for 467,000 cu. ft. of gas daily from Devonian black shale at a total depth of 4,090 ft. Also in Pike County, on Bent Branch, the same company completed 6586 J. C. Stratton for 234,000 cu. ft. of gas daily from Maxon sand at a total depth of 2,206 ft.

EASTERN KENTUCKY WILDCAT FAILURE

Lee County: Roy Davis et al 1 Sherman Bradley, 7-N-72, dry, TD 1,381 ft., Corniferous lime 1,343 ft., good show of oil but water broke in through casing.

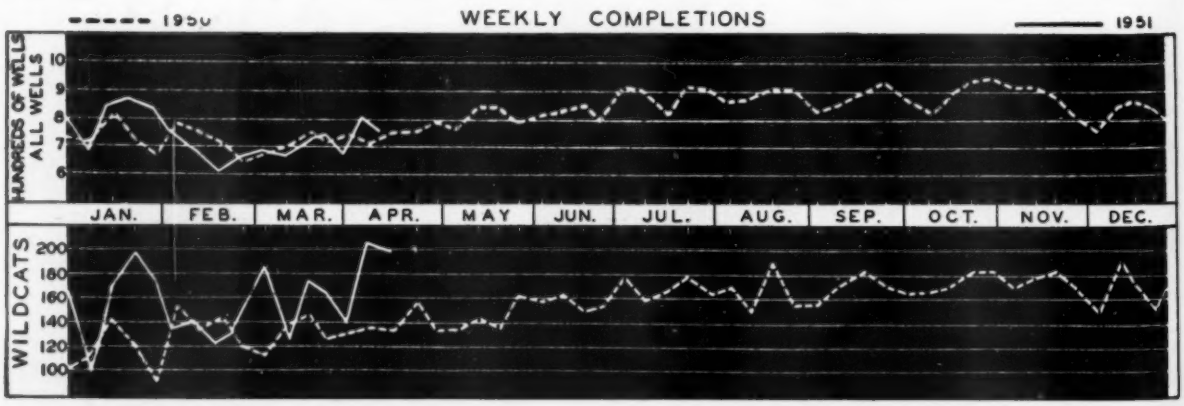
CURRENT STATISTICS

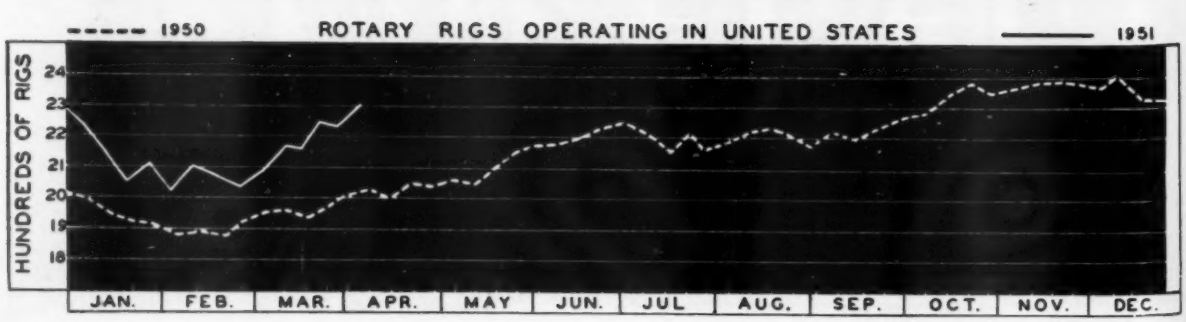
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED APRIL 14, 1951

	Total of all wells					Apr. 14		Wildcat completions and discoveries					Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	9	5	0	*4	13,004	112	164	0	0	0	0	0	0	0	0	0	0
Pennsylvania	20	10	4	†6	39,416	235	301	0	0	0	0	0	0	0	0	1	1
West Virginia	13	1	10	2	33,536	171	176	0	0	0	0	0	0	0	4	2	6
Ohio	13	3	2	‡8	23,646	227	257	0	0	0	0	0	1	0	3	9	13
Indiana	34	11	0	23	60,351	269	299	0	0	0	8	8	8	0	1	60	69
Kentucky	16	4	3	9	25,872	219	232	0	0	0	5	5	3	0	0	37	40
Illinois	25	8	0	17	62,462	441	580	0	0	0	6	6	11	0	0	71	82
Michigan	15	3	0	12	33,161	197	201	0	0	0	10	10	3	0	3	81	87
Kansas	99	50	8	§41	324,749	1,154	968	9	0	1	17	27	55	0	4	207	266
Nebraska	6	0	0	6	23,731	86	20	0	0	0	4	4	2	0	1	38	41
Oklahoma	101	59	2	‡40	380,351	1,527	1,417	4	0	1	16	21	58	1	8	196	263
Texas	279	168	8	103	1,211,173	4,549	4,480	16	0	1	62	79	189	19	32	835	1,075
North Central (Dist. 7-B & 9)	92	46	1	45	290,088	1,359	1,397	10	0	0	29	39	94	0	5	336	435
West (Dist. 7-C & 8)	75	54	0	21	415,145	1,390	1,304	1	0	0	15	16	35	5	1	169	210
Panhandle (Dist. 10)	10	6	1	3	29,416	198	306	0	0	0	1	1	0	0	0	9	9
Eastern (Dist. 5, 6, & 6-P)	40	26	1	13	141,096	332	305	1	0	0	5	6	1	1	0	68	70
Gulf Coast (Dist. 2 & 3)	35	20	2	13	196,588	640	601	1	0	1	7	9	32	9	21	119	181
Southwest (Dist. 1 & 4)	27	16	3	8	138,840	630	567	3	0	0	5	8	27	4	5	134	170
Louisiana	40	18	3	19	295,269	569	653	0	0	1	7	8	16	0	4	78	98
Northern	17	5	2	10	74,952	269	337	0	0	1	5	6	4	0	3	41	48
Southern	23	13	1	9	220,317	300	316	0	0	0	2	2	12	0	1	37	50
Arkansas	8	3	0	5	38,444	110	99	1	0	0	4	5	3	0	1	19	23
Mississippi	3	2	0	1	18,434	67	95	0	0	0	1	1	4	2	0	27	33
Southeastern States	2	1	0	1	10,844	16	19	0	0	0	1	1	0	0	0	3	3
Montana	6	0	0	6	15,274	56	30	0	0	0	2	2	0	0	0	18	18
Wyoming	11	7	1	3	48,546	193	153	0	0	0	3	3	4	0	0	31	35
Colorado-Utah	6	2	0	4	22,141	68	19	0	0	0	1	1	2	0	1	33	36
New Mexico	13	4	5	4	47,805	187	194	0	0	0	3	3	4	0	5	21	30
California	40	26	0	14	161,962	565	478	1	0	0	12	13	14	0	1	118	133
Miscellaneous (No. Dak.)	2	0	0	2	11,166	13	3	0	0	0	2	2	0	0	6	7	13
Total United States	761	385	46	330	2,901,337	11,031	10,838	31	0	4	164	199	377	22	74	1,892	2,365
Total previous week	810	450	42	318	3,161,166	....	....	32	3	7	165	207	346	22	70	1,728	2,166
Total April 14, 1950	742	462	38	242	2,845,709	....	....	20	1	3	109	133	272	20	64	1,591	1,947

Service wells included: *3, †5, ‡1, §2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 14 crude oil	B. of M. Apr. demand	Apr. 7 crude oil
Alabama	2,750	2,400	2,750
Arkansas	77,950	86,000	79,150
California	965,300	970,000	965,600
Colorado	77,800	79,000	78,500
Eastern	59,600	66,000	59,000
Florida	1,550	1,600	1,625
Illinois	158,700	166,000	157,500
Indiana	25,600	31,000	29,600
Kansas	305,100	308,000	311,950
Kentucky	27,300	31,000	28,000
Louisiana	609,025	632,000	609,275
North Louisiana	114,100		114,350
South Louisiana	494,925		494,925
Michigan	38,100	45,000	39,300
Mississippi	98,350	112,000	97,550
Montana	24,200	24,000	24,200
Nebraska	9,900	10,000	10,100
New Mexico	143,850	142,000	143,850
Oklahoma	492,950	506,000	492,000
Texas	2,725,375	2,500,000	2,725,375
Dist. 1 (Southwest)	33,525		33,525
Dist. 4 (Southwest)	254,650		254,650
Dist. 2 (Gulf Coast)	162,325		162,325
Dist. 3 (Gulf Coast)	481,825		481,925
Dist. 5 (Eastern)	51,475		51,475
Dist. 6 (Eastern)	111,575		111,575
East Texas field	279,000		279,000
Dist. 7-C (West)	91,725		91,725
Dist. 8 (West)	935,900		935,900
Dist. 7-B (W. Central)	83,425		83,425
Dist. 9 (N. Central)	150,250		150,250
Dist. 10 (Panhandle)	89,700		89,700
Utah	3,700	5,000	3,800
Wyoming	198,100	183,000	197,500
Total United States	*6,045,200	5,900,000	6,056,625
Change from prev. week, down	11,425		
Canada	93,285		49,075

Total U. S. production January 1-April 14 ..... †631,356,810 bbl.
Same period last year (crude plus cond.) ..... 514,412,955 bbl.

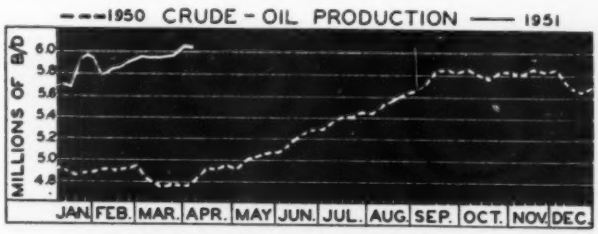
*Not including 110,155 bbl. condensate. †Including 11,085,655 bbl. condensate.

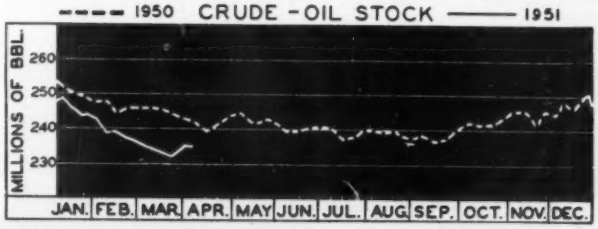
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

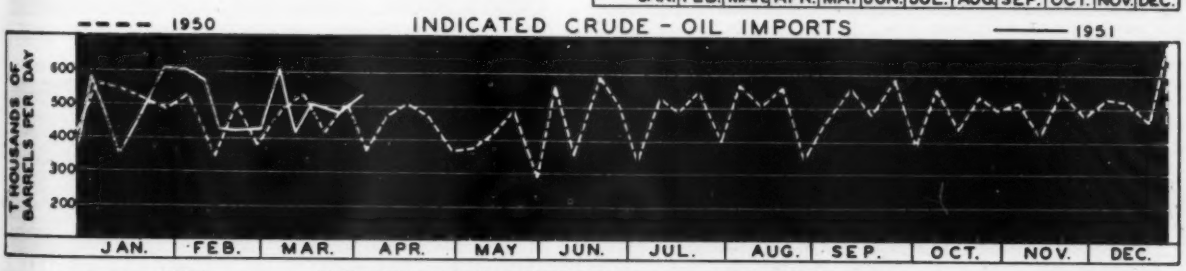
(Thousands of barrels)

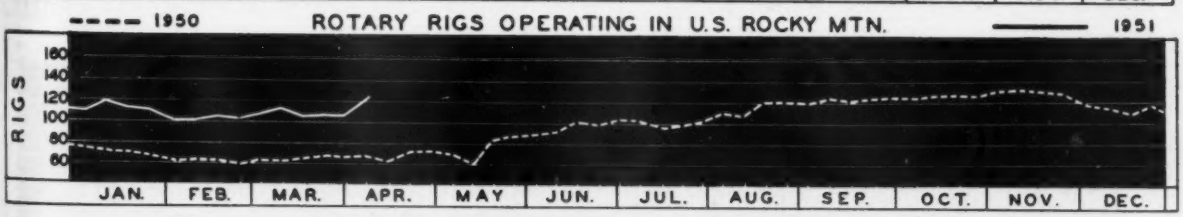
	Apr. 7, 1951	Mar. 31, 1951	Apr. 8, 1950
Pennsylvania Grade	2,059	2,058	2,817
Other Appalachian	1,408	1,333	1,517
Illinois, Indiana, Michigan	9,275	8,722	9,696
Arkansas	2,817	2,802	3,145
Louisiana	14,382	14,124	15,230
North	3,034	2,748	3,552
Gulf	11,348	11,376	11,678
Mississippi	2,996	2,881	2,347
New Mexico	7,063	7,259	6,642
Oklahoma and Kansas	37,473	37,260	35,098
Texas	108,128	110,331	105,547
East Texas	14,366	14,333	14,528
West Texas	44,447	44,899	37,374
Texas Gulf	23,697	23,947	28,144
Other Texas	25,618	27,152	25,501
Rocky Mountain	13,087	12,636	13,435
California	30,437	30,234	37,838
Foreign	6,471	6,316	6,151
Total	235,596	235,956	239,463

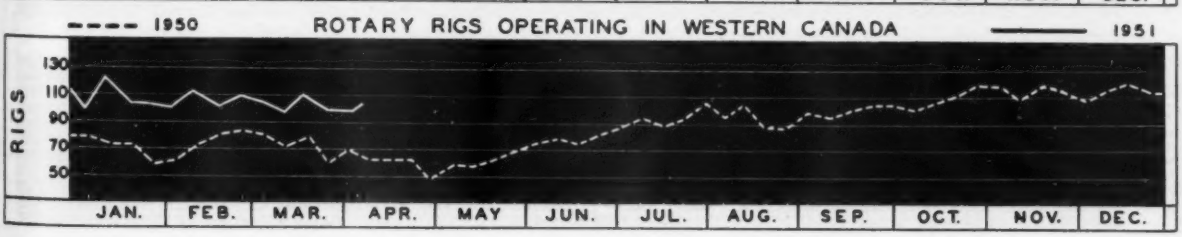
*Bureau of Mines.









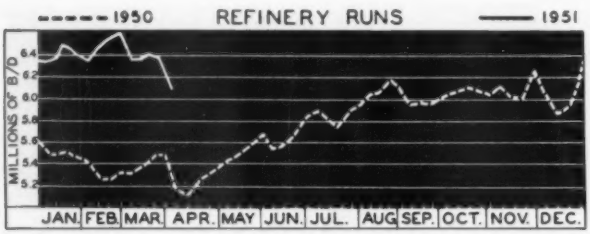


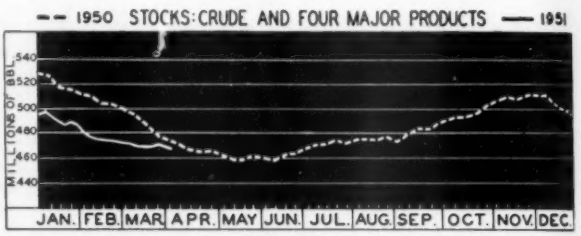
A.P.I. REFINERY REPORT, APRIL 7

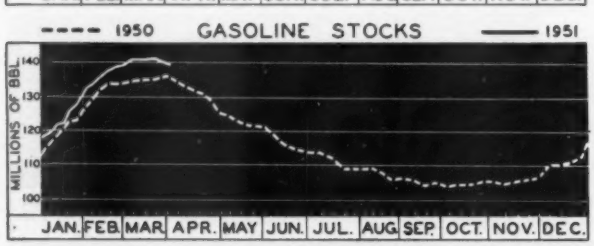
(Thousands of barrels)

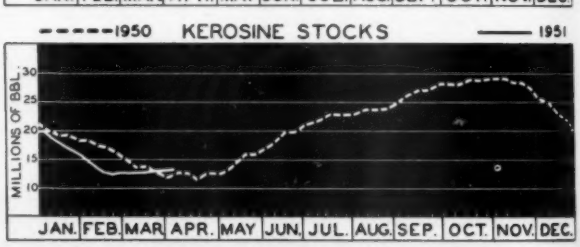
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, April 1950: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,017	355.0	51.0	251.0	200.6	26,859	5,640	11,683	7,773	871	360.0	34.4	172.9	201.4
Appalachian:														
District 1	104	36.9	7.4	12.3	13.7	2,751	234	506	262	88	37.0	7.4	11.9	10.7
District 2	61	28.0	4.7	8.3	12.1	1,374	76	148	123	72	32.6	4.4	9.0	15.9
Ind., Ill., Ky.	1,140	559.7	66.8	202.8	181.9	32,532	2,410	7,124	2,788	935	470.1	63.0	155.0	151.9
Okla., Kans., Mo.	463	251.8	22.9	107.1	64.4	16,121	658	4,803	1,002	430	241.0	19.0	83.8	58.1
Inland Texas	240	138.3	11.3	53.4	48.9	3,998	278	643	719	193	132.6	11.5	23.5	39.7
Texas Gulf Coast	1,459	656.4	102.0	313.1	270.6	22,728	2,003	5,567	4,594	1,081	531.9	83.8	226.3	195.0
La. Gulf Coast	407	234.9	47.0	124.9	57.1	7,274	1,259	2,379	1,607	442	231.7	51.6	98.3	44.7
N. La. and Ark	82	31.9	8.7	18.9	8.0	2,676	188	689	61	70	25.3	7.0	15.0	12.4
Rocky Mountain:														
New Mexico	13	7.0		2.6	2.7	86	25	60	29	14	7.7	0.4	2.3	3.5
Other Rocky Mtn.	191	90.4	4.9	33.6	40.0	5,900	244	1,198	702	157	73.4	2.4	31.8	33.4
California	915	367.7	2.0	156.0	368.1	17,429	516	7,554	16,872	840	364.6	10.1	141.9	274.1
April 7, 1951	6,092	2,758.0	328.7	1,284.0	1,268.1	139,728	13,533	42,354	36,532	5,193	2,507.9	295.0	976.7	1,040.8
March 31, 1951	6,381	2,914.0	404.0	1,337.9	1,306.7	‡142,433	13,285	43,170	37,282					
April 8, 1950	5,170	2,541.7	308.0	949.7	1,111.9	135,116	12,784	38,288	40,494					

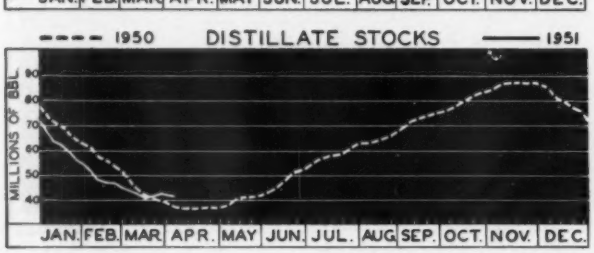
*At refineries including natural blended. †Finished and unfinished. ‡Revised.

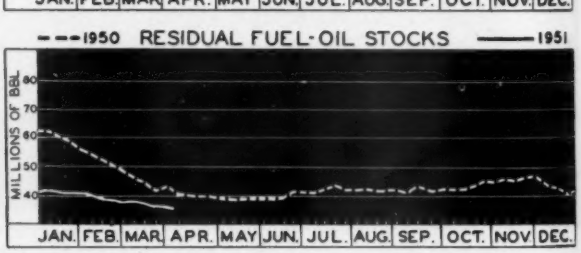


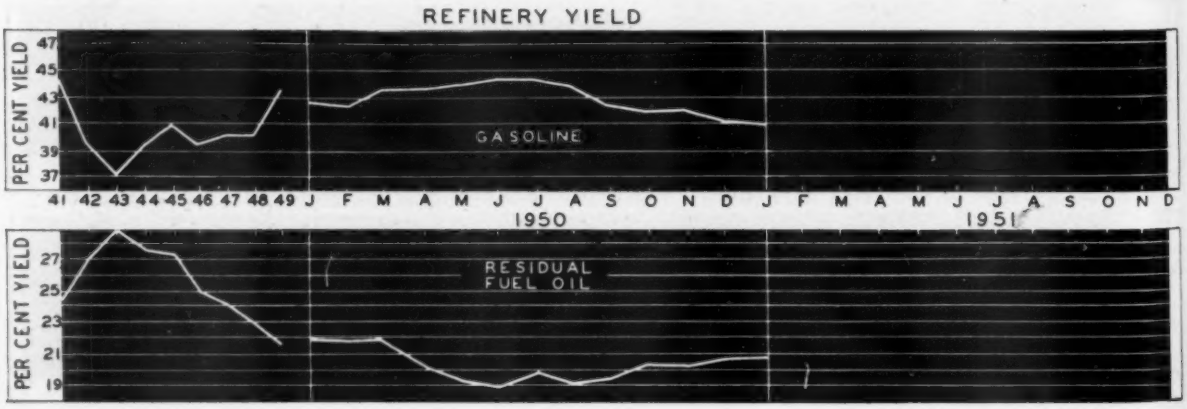












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

SOME of the lack of balance between East Coast and Gulf Coast prices has been wiped out by recent reductions in tanker rates, but it still costs more than twice as much to move material to East Coast ports at these rates as it did last summer when present prices were established. On the other hand, decreases in tanker rates have been offset partially by increases in barge rates since the first of the year. For the area north of Hatteras, the increase is estimated to average about 20 per cent.

Higher barge rates have been particularly disturbing for jobbers and resellers along the coast since they were not covered by ceiling-price regulations set up by the Office of Price Stabilization. Under regulation 17, automatic price increases are allowed to cover transportation rate increases permitted by federal or state regulatory bodies or by OPS. Since barge operators classify themselves as unregulated common carriers, the recent increases in barge rates do not come under any classification outlined by OPS.

Spot prices for cargoes of No. 2 fuel and kerosine at Gulf Coast ports are reported to be firm at regular-customer levels of 7.5-8 cents a gallon for No. 2 and 8.5-9 cents for kerosine. The reduction in supply of tetraethyl lead has caused a relatively tight premium-gasoline market. Regular gasoline is reported available at the low of the market. Residual fuel continues as the tight product at both Gulf Coast and East Coast ports.

Total gasoline stocks decreased 2,705,000 bbl. for week ended April 7, but part of the decrease was due to a drop of 1,092,000 bbl. in gasoline production. Stock withdrawals in District 1 and District 3 accounted for 2,474,000 bbl. of the total decrease in gasoline stocks for the week. Stocks in District 2 were down 94,000 bbl.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of April 16, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅛-11½	13.5-13.75	11¾-12
43-44 w.w. kerosine	9¼-9⅜	10	8½-9
No. 2 straw fuel oil	8¼-8⅝	9-9.25	7½-8
No 6 residual	$1.75-1.90	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

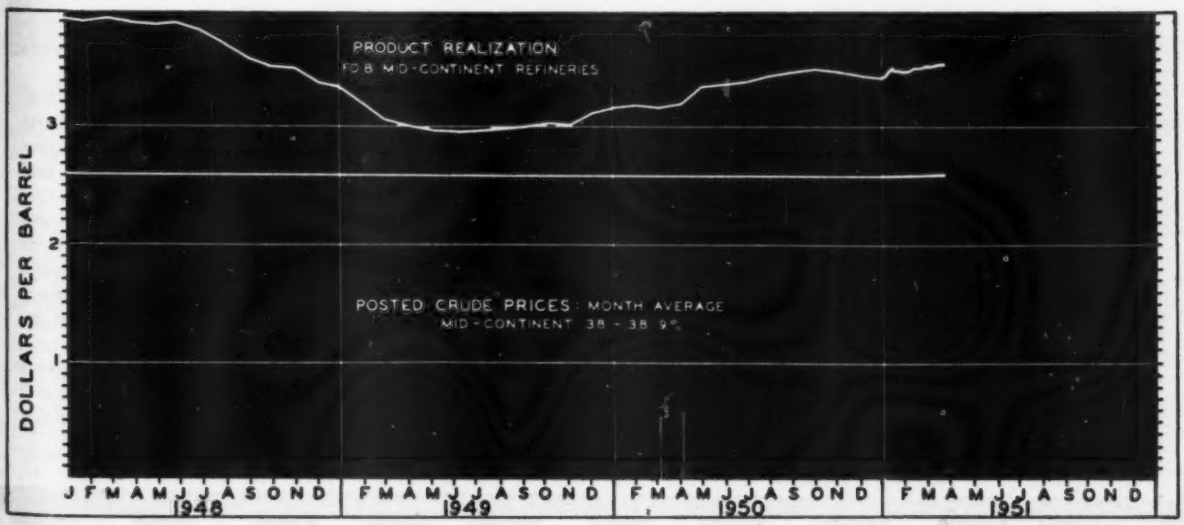
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

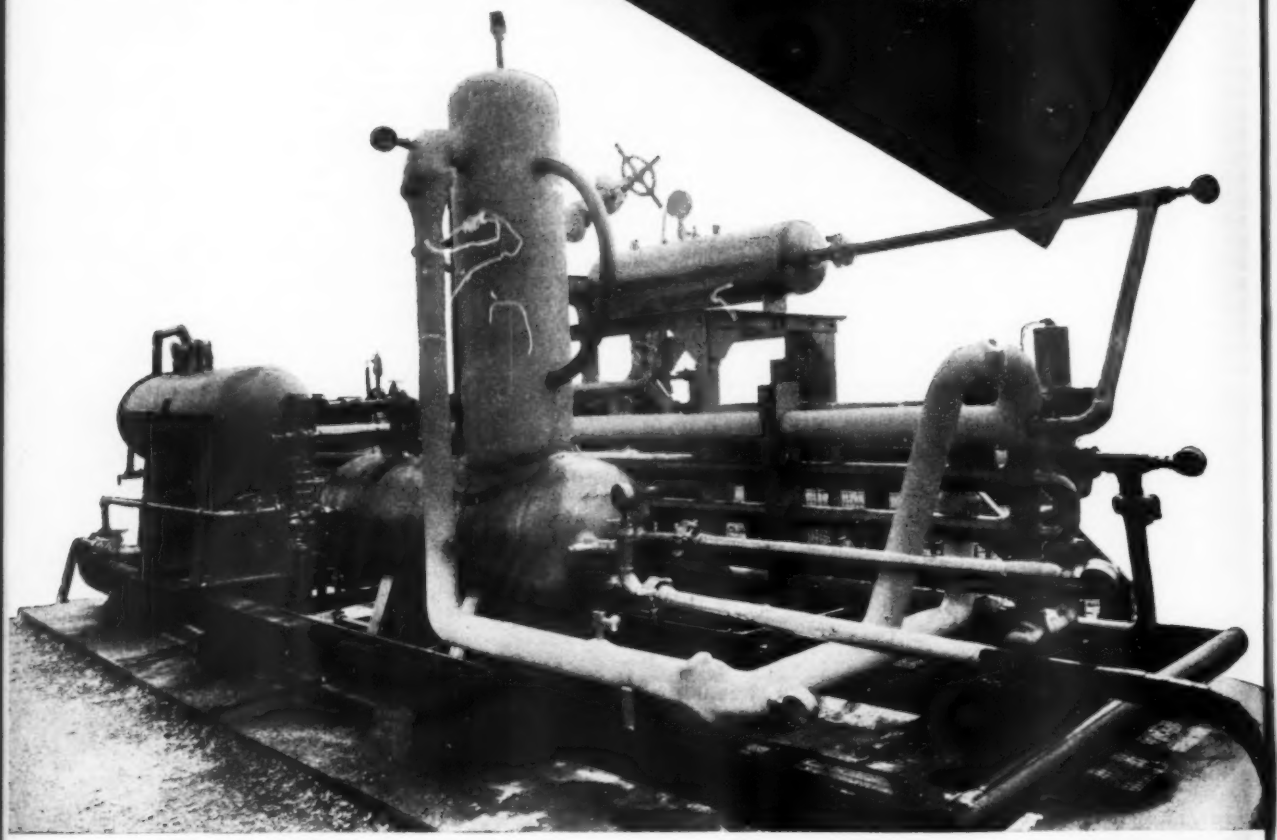
Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.55 for week ended April 7, $3.55 for previous week, and $3.24 for April 1950.

HYRECO PAYS OUT FAST.....



with increased earnings from increased condensate recovery

When you put your gas well on production, the usual thing is to set a separator and, if necessary, install a heater to prevent freezing of controls and lines.

For only a few more dollars you can install a Parkersburg Hyreco Unit. But, and this is important, Hyreco quickly pays-out this slight additional cost. And, in considerably less time than it takes to recover the cost of your conventional heater-separator hook-up Hyreco pays-out completely, and from then on, earns big returns on your investment.

Why? Hyreco increases condensate recovery by 10% to 25% . . . and more . . . over conventional hook-ups. Hyreco eliminates the cost of operating a heater throughout the life of a high pressure gas well. Hyreco eliminates expensive downtown due to freezing. In almost every case, Hyreco eliminates the need for dehydration units to prepare gas for delivery to pipe line companies.

Your Parkersburg Representative has comparative records that prove Hyreco increases condensate recovery . . . increases earnings that make it pay-out fast. Ask him about them or write to us in Parkersburg for details.

5107

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Manufactured in Houston, Texas

EQUIPMENT MEN . . . in the News

BS&B Reveals Oklahoma City Plant, Personnel Expansion

Plans for a major expansion of the Oklahoma City plant of Black, Sivalls & Bryson, Inc., and the moving of the

H. A. RUYSSER

C. H. MEYERS

oil and gas equipment division, including engineering and sales staffs, to Oklahoma City where the company's oil-field equipment is fabricated and distributed, were recently announced by K. W. Lineberry, president. The announcement was made at a recent dinner meeting of regional, branch, and sales personnel of the oil and gas sales division of the company.

In February of this year, Lineberry had announced the appointment of Henry A. Ruysser, Jr., vice president, as general manager of sales for BS&B. Under the expanded Oklahoma City program, Charles H. Meyers, vice president, continues as manager of the Oklahoma City plant and approximately 25 engineers and supervisors will be transferred from the general offices in Kansas City, to Oklahoma City.

R. W. NICHOLS

F. C. MYERS

Ralph W. Nichols has recently rejoined BS&B as sales manager of their oil and gas-equipment division, and will establish headquarters at Oklahoma City. Floyd C. Myers, manager of branch operations, will transfer headquarters from Kansas City to Oklahoma City.

The expansion program, which will start immediately and be completed within the year, will increase the Oklahoma City plant's productive output 50 per cent and should increase the number of productive workers about 25 per cent.

A new high bay, 80 ft. by 600 ft., and a low bay, 40 ft. by 240 ft., will be constructed. A total of 57,000 sq. ft. of manufacturing area will be added. Plans call for additional electrical-power facilities for expanded and modernized welding procedures, a new product-development and metallurgical laboratory, and the relocation, redesigning, and rebuilding of the stress-relieving oven.

After graduating from Kansas University in 1926, Nichols served as chief engineer with the Wooded Hills Development Co. for 2 years, and as chief engineer with Darby Corp. for 3 years. He then joined BS&B, serving successively as estimator, draftsman, engineer, project engineer, contact man, and manager of the Fort Worth sales office. From 1945 until late 1950 he was sales manager for Richmond Engineering Co.

F. C. Myers started with BS&B in 1929 as a clerk in the Tulsa office. He later transferred to sales and service work in Texas, becoming a branch manager in 1935. After 5 years he was made assistant credit manager, assuming the duties of credit manager during the war period. He became district sales manager for West Texas in 1946.

Fabj Named to Merchandise Post by Oil Well Supply

Lee Fabj has been appointed district-merchandise manager for Oil Well Supply Co.'s south Louisiana-Mississippi district, according to F. D. Smith, Gulf Coast division manager for this U. S. Steel subsidiary.

Fabj will establish headquarters at the Harvey, La., store. In his new position he will supervise the stocking and administrative activities in connection with store operations in the district, whose headquarters are located at New Orleans.

Curtiss & Smith Appointed Distributors by Cummins

William H. Curtiss, president of Curtiss & Smith Manufacturing Corp., of Pottstown, Pa., recently announced the conclusion of negotiations with Cummins Engine Co. which have led to the appointment of Curtiss & Smith as manufacturers and distributors of tools and equipment for servicing the complete line of Cummins diesel engines.

In addition to this new line Curtiss & Smith manufactures tools for servicing G.M.C. diesel engines, trucks, and hydraulic transmissions.

Timken Announces Two Personnel Advancements

W. B. Moore, vice president in charge of sales of Timken Roller Bearing Co., announces the appointment of Paul Reeves as director of sales. Reeves came with Timken in 1929, and has served as sales engineer in the company's Chicago office, industrial district manager at San Francisco, and as sales-promotion manager in Canton, Ohio.

Moore also has announced the appointment of Seward T. Salvage as advertising manager. He joined Timken in 1933 as a sales trainee, and in 1934 was transferred to the Pittsburgh district office as sales engineer.

Buie Is Distributor For Butler Steel

Buie Building Material Co. has been appointed exclusive distributor in the Houston area for packaged Butler Steel Buildings.

Forrest P. Buie, head of the firm, said that Butler Steel Buildings offer a wide selection of sizes and designs to meet every need.

Buie Co., which has served the Houston building industry for 26 years, also handles Stran Steel, Ceco Steel windows, and a complete line of aluminum windows and other building products.

D. E. Noble Addresses Petroleum Institute

The basic problems involved in setting up two-way radio systems was discussed in a lecture given at the electrical-section meeting of the Petroleum Institute at Dallas April 18 by Daniel E. Noble, vice president in charge of communications and electronics division of Motorola.

Noble described for the executives of the oil and gas industry the practical systems and design problems relative to ultra-high frequency, very-high frequency, and microwave.

Emphasis was given to mobile relay

(Continued on page 300)

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DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

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FOR SALE: 17½" Oilbath Gumbo Buster Rotary Table. 2—6" Gumbo Buster Swivels. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: At our Sasakwa Gasoline Plant: 1—Fluor Cooling Tower, 10 bays high, 5 bays wide. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: In Oklahoma—1 used 175 KW, 219 KVA, 480V, 264 Amp., 3 phase, 60 cycle, 1200 RPM—AC, Westinghouse generator (bought new 1935) Serial #1519N362, powered through Twin Disc clutches and V belts by Right & Left Rotation Sterling 150 HP 5¼" x 6", Gas, Gasoline, Butane 6 cyl. engines. Originally used for Rotary oil well drilling rig. $6,500.00. Cities Service Oil Co.—Patridge—Bartlesville, Okla.

IMMEDIATE SHIPMENT
3100′ 13⅜" OD 54.5# J-55 8-RT, Range 2
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No. 1 Used Seamless Casing
16 mi. 6⅝" OD 18.97# No. 1 Used Lapweld P.E. Line Pipe S.R.L. Beveled.
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SUCKER ROD
(3300 Feet)

Used once 3 days to take potential. Located Winfield, Kansas. Price 60c per foot.

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EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE near Seminole, Oklahoma, one Braun, Size G portable distillation unit complete, Serial #7190, located in 24′ x 40′ x18′ Stefco steel frame sectional steel building. Price $10,000—Cities Service Oil Co.—Patridge—Bartlesville, Oklahoma.

FOR SALE: New Buda Gas-Gasoline Oil Field Power Units, Models 4MO-645 & 6MO-893, for complete details write Box 248, Mt. Pleasant, Michigan.

LIKE NEW—97′ Lee C. Moore Mast, 6′ Substructure, Steel flooring, 4000′ Good drilling pipe. Fred H. Kiel, Phone 2-7333—Wichita Falls, Texas.

IMMEDIATE DELIVERY and prompt erection on 2,500, 3,500 and 5,000 bbl. capacity riveted or welded tanks. Good condition. Address: P. O. Box 2297, Tulsa, Oklahoma.

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GOOD BUY—8" COLLARS
26#, Line Pipe Couplings
Oilton Pipe & Supply Co., Oilton, Okla.

CABLE RIG for 6,000′ on tandem truck. Bargain. Located Tonkawa, Oklahoma. Contact: G. M. McLaughlin, 3506 West Pikes Peak, Colorado Springs, Colorado. Phone 6887-J.

FOR SALE near Madison, Kansas, 2 band wheel and one geared pumping powers complete. Cities Service Oil Patride—Bartlesville.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted. immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

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Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

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45,000′ 5½" 15½# and 17# J 55, seamless casing, Short T & C, range 2, 8 RT.
17,500′ 7" 20# J 55, seamless casing, short T & C, range 2, 8 RT.
28,000′ 2" 4.70# seamless external upset tubing, J 55, range 2, 8 RT.
All above new material.

J. P. NAHAS
Snyder, Texas, P.O. Box 638, Phone 1129

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VIRTUALLY UNOBTAINABLE LINE PIPE AND OIL WELL CASING
LARGE QUANTITIES—IMMEDIATE DELIVERY

800,000′ ½" Standard Black Welded Plain End, 21′ Lengths
110,000′ 2" Standard Black Welded Plain End, 21′ Lengths
100,000′ 2¼" OD x .140" Wall Recond. Seamless Tubing (Sub. 2" Std.)
25,000′ 2⅞" OD x .150" Wall 4.5# Seamless Pipe (Sub. 2½" Std.)
75,000′ 5⅝" OD x .258" Wall 14.87# Used Lapweld, 21′ Lengths
100,000′ 7" OD 17# & 20# Used Lapweld Casing (Sub. 6⅝" or 8⅝" O.D. Pipe)

TUBING AND CASING

40,000′ 2⅜" OD 4# Good Used Lapweld Range 1 T&C Tubing, 11½ V-Threads
15,000′ 2⅜" OD 4# Good Used Lapweld Range 1 T&C, New 10 Round Thread
30,000′ 2⅜" OD 4.6# Like New Seamless Range 2 Tubing, 10 Round Thread
20,000′ 2⅞" OD 6.4# Like New Seamless Range 2 Tubing, 10 Round Thread
25,000′ 5½" OD 14# Good Used Lapweld Casing, Range 1, 11½ V-Threads
10,000′ 5½" OD 17# Good Used Lapweld Casing, Range 1, 11½ V-Threads
50,000′ 7" OD 17# Good Used Lapweld Casing, Range 1, 10 V-Thread
35,000′ 7" OD 20# Good Used Lapweld Casing, Range 1, 10 V-Thread

SUBJECT TO PRIOR SALE

OTHER SIZES NEW AND USED CASING, TUBING, LINE PIPE AND SEAMLESS TUBING . . . MANY SIZES SUITABLE FOR GAS, OIL, WATER FLOW LINES. FOR FULL DETAILS, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.

XUM

EQUIPMENT FOR SALE

FOR SALE or Lease with Purchase Option: Complete drilling rig, capacity 5000 feet, with practically new Model RL Cardwell drawworks. 7¼ x 12 Gardner-Denver pump. 96 foot cantilever type derrick. Box D-975, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: About 2500 feet of 8⅝-in. Lapweld, Range 1, oil well casing. Good, clean and ready to run. C. H. Reser, Hamilton, Kansas. Phone 2791.

FOR SALE: One Houston Portable Rotary Drilling Rig complete. Excellent condition, ready to drill wells up to 6000 Ft. Two strings Drill Pipe. Contact H. H. Blair, 600 Bitting Building, Wichita 2, Kansas. Telephone #7-3241.

EQUIPMENT FOR SALE

AVAILABLE for sale and immediate shipment line pipe, seamless and lapweld casing, tanks. Call or write Edco Pipe & Supply Company, Box 565, Drumright, Oklahoma.

3,000-ft. rotary rig. Wilson PA 100 engine. 9D 7¼ x 10 pump. Climax 160 HP engine. 900 ft. 4½ FA Emsco swivel. Traveling block. Wire line. 38 ft. kelly. 32 ft. DC Elevators, Slips, Hook. $16,000 cash. Box D-958, The Oil and Gas Journal, Tulsa, Oklahoma.

CASING PULLING CONTRACTORS with Hydraulic Equipment: Experienced operators—Pull any size pipe, anywhere. Also will buy wells for salvage. GENERAL CASING PULLING CO., P.O. Box 4387, Oklahoma City. Phone 6-1335.

EQUIPMENT FOR SALE

FOR SALE: At Oklahoma City Warehouse, 1 Allis-Chalmers Model UM-4 Skid Type Well Servicing Winch, $950.00. No mast—Cities Service Oil, Patridge, Bartlesville, Oklahoma.

2000′ capacity WILSON rotary DRAW WORKS, unitized on long steel skids with almost-new engine, telescoping mast derrick with roller bearing crown block and Brewster ROTARY TABLE—$6,000. Also Oilwell SWIVEL—$350; 2000′ DRILL PIPE, 30′ with Hughes Tool Joints—$1.25/foot. John Barrington, Graford, Texas. Phone 102-F-3.

CATERPILLAR D-13000
Completely rebuilt and guaranteed. Priced right. Martin Tractor, Chanute, Kansas.

90 HP Direct Driven Superiors. Extra cylinders, 80 HP C & G Coopers. Location Oklahoma. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

1—3,000 GPM Fluor Atmospheric Tower, Model 23-A-15, California redwood; brass bolts, nuts and washers; copper nails; two distribution systems. Good condition. 1—Worthington pump, 1,500 gpm @ 30 ft. TDH, 1,800 rpm on base with 30 HP GE Motor. 1—Worthington pump, 800 gpm @ 110 ft. TDH, 1,750 rpm on base with 50 HP Motor. 1—Gould pump, 1,200 gpm @ 70 ft. TDH, 1,175 rpm on base with 35 HP Valley Electric Corp. Motor. 1—Ingersoll-Rand pump, 3,000 gpm @ 72 ft. TDH, 1,175 rpm with 100 HP Westinghouse Motor. All equipment available in May, 1951. Will sell all as a unit or separately. Located at 1100 East 21st Street, Wichita, Kansas. Derby Oil Company, P. O. Box 1030, Wichita, Kansas.

1—WILSON Giant Draw Works, complete with Kelco Automatic Spinning Cathead and American Simplimatic Breakout Cathead, with two engine compound complete with friction clutches, air operated, pump drive, two LeRoi V-8 No. RXIV 8-cyl. Engines of 225 H.P. each, complete with starting engines, Sun Oil Filters, magnetos, and all trimmings including radiators.

228 Joints 4½″ O.D. used Seamless, Grade "D," Range 2, Drill Pipe, with Hughes Flashweld Tool Joints A.P.I. full hole. Wire or write Mid-Union Drilling Corp., 624 South Cheyenne, Tulsa, Oklahoma, telephone 4-8163.

FOR SALE

AVAILABLE IN ONE LOT FOR IMMEDIATE SHIPMENT

3—DIESEL TORQUE CONVERTERS

Engines: Twin GM Model 6-71 (Completely Remanufactured and Guaranteed)
Torque Converters: New Twin Disc Model F

1—DIESEL POWER UNIT

Engine: Twin GM Model 6-71 (Completely Remanufactured and Guaranteed)
Reduction Gear: New GM 1-77:1 Heavy-Duty

DIESEL DIVISION—NATIONAL METAL & STEEL CORP.
Dept. OJ, Terminal Island (Los Angeles Harbor), Calif.
Telephone: Los Angeles—Nevada 6-2517

LIQUIDATION SPECIAL—Late Type Petroleum Equipment

TOWERS AND VESSELS

1—36″ ID x 40′ w/16 Trays; 250# WP @ 650 F.
1—36″ ID x 44′ w/24 Trays; 250# WP @ 650 F.
2—42″ ID x 47′ w/20 Trays; 175# WP @ 650 F.
1—36″ ID x 41′—Packed—300# WP @ 175 F.
1—48″ ID x 22′ w/6 Trays; 650# WP.
1—108″ ID x 60′ w/23 Trays—Atmospheric WP.
1—24″ ID x 35′ w/18 Trays; 75# WP @ 400 F.
1—24″ OD x 10′ Vessel—100# WP @ 400 F.
2—30″ OD x 10′ " —150# WP @ 500 F.
1—30″ OD x 10′ " —100# WP @ 400 F.
1—36″ OD x 8′ " —200# WP @ 250 F.
1—30″ OD x 6′ " —675# WP @ 400 F.
1—12½″ OD x 5′2″ " —675# WP @ 400 F.
1—48″ OD x 10′ " —200# WP @ 250 F.
2—24″ OD x 8′ " —250# WP @ 650 F.
1—42″ OD x 10′ " —250# WP @ 650 F.
2—42″ OD x 8′ " —175# WP @ 350 F.

HEAT EXCHANGERS

Griscom-Russel—"G-Fin" Three 4-Sections w/411 Sq. Ft. area ea.
Struthers-Wells Shell & Tube—
3—Coolers—125# WP Shell & Tube; 451 Sq. Ft., Steel Tubes.
1—Reboiler—75# Shell—150# Tube; 112 Sq. Ft., Steel Tubes.
1—Condenser—75# Shell—125# Tube; 107 Sq. Ft., Steel Tubes.
1—Cooler—650# Shell—125 WP Tube; 740 Sq. Ft., Steel Tubes.
1—Cooler—650# Shell—125# Tube; 1510 Sq. Ft., Adm. Tubes.
*1—Preheater—350# Shell—300# Tube; 758 Sq. Ft., Steel Tubes.
*1—Preheater—350# Shell—250# Tube; 1205 Sq. Ft., Steel Tubes.
*2—Coolers—300# Shell—125# Tube; 1510 Sq. Ft., Adm. Tubes.
1—Condenser—250# Shell—125# Tube; 508 Sq. Ft., Adm. Tubes.
*2—Condensers—175# Shell—125# Tube; 690 Sq. Ft., Adm. Tubes.
1—Preheater—725# Shell—350# Tube; 400 Sq. Ft., Steel Tubes.
*2—Condensers—125# Shell—125# Tube; 550 Sq. Ft., Adm. Tubes.
1—Cooler—250 # Shell—125# Tube; 1510 Sq. Ft., Adm. Tubes.
*Spare Bundle Included.

PUMPS—Centrifugal (Water Cooling Service)

3—Steam Turbine Driven—3200 GPM @ 70# Head Pressure.

PUMPS—Reciprocating—Steam Simplex

4—	National	Transit	"Close	Clearance"	12″ x 3″ x 12″
2—	"	"	"	"	10″ x 7″ x 18″
3—	"	"	"	"	6″ x 5″ x 12″
2—	"	"	"	"	4½ ″ x 3″ x 6″
1—	"	"	"	"	6″ x 2″ x 12″

THIS IS USED EQUIPMENT—IN GOOD CONDITION

KINSLOW POWER & EQUIPMENT, INC.
817 So. Boulder **Phone 5-5914**
Tulsa 14, Oklahoma

OFFER FOR QUICK SALE
500 Standard 4-Inch
CAST IRON FLANGES
* *
2½ Gal. All Brass
FOAM FIRE EXTINGUISHERS
Morton I. Glass
8401 Wornall Rd., Phone HI. 4687
Kansas City, Mo.

FOR SALE

NEW OIL WELL CASING

Now offering the following sizes, subject to prior sale:

5½″—7″—8⅝″—9⅝″

Box D-979, The Oil and Gas Journal
Tulsa, Oklahoma

2,000 Feet

NEW STEEL PIPE

26″ O.D.
.281 wall—40 foot lengths
Electric Weld
Immediate Delivery
Subject to prior sale
Write—Wire—Phone

Sonken-Galamba Corp.
2nd and Riverview (X-691)
Kansas City 18, Kansas
THatcher 9243

XUM

EQUIPMENT FOR SALE

FOR SALE: 24 L Bucyrus and 71 Star speed spudders equipped excellent condition. 240 Star with tools. C. A. McMillen, Titusville, Pa. Phone 3-1351 evenings.

WELL EQUIPMENT: New and used spudders, rotaries, core drills—all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools. Everything for Well Service. Pressey & Son, Pueblo, Colorado.

EQUIPMENT FOR SALE

FOR SALE: 2 Used Franks Mfg. Co., Tulsa, Core Drill Units, Model 1000—Mounted on Ford Trucks. Cities Service Oil Co.—Patridge—Bartlesville.

COMBINATION ROTARY AND SPUDDER complete for shallow drilling, with 3½ drill pipe, drill collars, mud pump, light plant, and cable tools. Loggie Brothers, City National Bldg., Wichita Falls, Texas.

COMPLETE DRILLING RIGS FOR SALE

1. **NATIONAL 50** Ideco 136′ mast, National C-350 and G-D FXQ pumps. Two 12 cylinder LeRois on draw works and FXQ pump. Two Waukesha LROs on C-350.
2. **EMSCO GA-500** Ideco 136′ mast, National C-350 and G-D FXQ pumps. Two GM Twin diesels on draw works and FXQ pump. One GM Quad diesel on C-350 pump.
3. **EMSCO J-750** Ideco 136′ mast, G-D FXL and Emsco P-16 pumps. Three GM Twin diesels on draw works, power takeoffs to both pumps, two GM Quad diesels, one on each pump.
4. **NATIONAL 125** One Oilwell 220P pump, one Oilwell 20P pump, one W-S 7P pump. Four Waukesha LRO engines with National fluid couplings on draw works with takeoff to 220P pump, two Waukesha LROs with National fluid couplings on 20P pump, one Waukesha EKH on 7P pump.
5. **K-W RIG** Emsco UB-54 draw works with National reverse gear, Ideco 136′ mast, National C-350 and Emsco CA-16 pumps, two 12 cylinder LeRoi gas engines on draw works, two Waukesha LROs on C-350 pump, one Superior 6G510 on Emsco pump.

EACH OF THESE RIGS IS COMPLETE AND READY TO DRILL. EACH IS FULLY UNITIZED FOR SPEEDY MOVING AND RIGGING UP. REASONABLY PRICED. FOR FULL PARTICULARS AND COMPLETE INVENTORIES CONTACT

Rocky Mountain Drilling Company

612 South Flower Street — Los Angeles 17, California

Phone Michigan 6215

EQUIPMENT WANTED

SWIVEL

3″ Kelly and hose for reverse Circulator. Standard Drilling Company, Phone 3-4406, Oklahoma City, Okla.

WANTED: Good used well drilling equipment. Spudders, rotaries, large or small. Tools and general equipment. We distribute throughout the West with hundreds of customers. Pressey & Son, Pueblo, Colorado.

WANTED: New and used steel Gate Valves, also Plug Valves—Any Quantity. W. Rosenstein, Box 1865, Tulsa, Oklahoma.

WANTED TO BUY

Used Pressure Vessel in good condition, approximately 5′-0″ diameter, by 70′-0″ long, of ⅜″ or ½″ plate.

THE SHALLOW WATER REFINING CO.
Garden City, Kansas

HELP WANTED

GEOPHYSICAL SURVEYOR: Minimum two years' experience on transit; do not apply otherwise. Box D-921, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Fully qualified and experienced for position of Chief Geophysicist with well-known contracting company. Application must state complete qualifications, references and salary expected. Box D-918, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANTS—Integrated oil company in Kansas City area has openings in Pipe Line (ICC), Production and Refinery Departments offering opportunities for advancement. Applicants should have accounting degree or experience in one of above fields of accounting. Liberal retirement and other employee benefits. In reply give complete personal history. State salary expected. Replies confidential. Box D-968, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

EXPERIENCED Seismic Party Chiefs, Computers, Operators, Surveyors, and Shot Hole Drillers. Box D-970, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Two geologists for assignment Middle East. Must be single and have at least three years surface experience with good background in stratigraphy. Reply Box D-956, The Oil & Gas Journal, Tulsa, Oklahoma.

ALL-AROUND MAN for independent operator; with experience in completion, leasing and production, Tulsa area. Must have own transportation. State qualifications and salary expected. Box D-973, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—SAFETY ENGINEER

Large Insurance General Agency desires an experienced safety engineer for servicing oil industry accounts. In reply state qualifications and experience.

Box D-965, The Oil and Gas Journal, Tulsa, Oklahoma

PROCESS ENGINEER

To be located in Tulsa, Oklahoma, to work on projects in Petroleum and Petro-Chemical field. Operating experience desirable but not required.

Letter should include details of education, experience, family and military status, and salary expected. Personal interview can be arranged.

Chemical Plants Division

BLAW-KNOX CONSTRUCTION COMPANY

Box 1266 — **Tulsa, Oklahoma**

HELP WANTED

SEISMOGRAPH PARTY CHIEF and Computer wanted by new aggressive company Box D-920, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSTRUCTION SUPERVISOR having long record of experience in erection of oil refining process equipment. Must have intimate knowledge of erection operations in detail. Minimum eighteen months assignment in Brazil. Attractive dollar salary plus living allowances and transportation for family. Reply giving complete resume stating age, education, experience, positions held, name of employers, present status, references and past earnings. No contact with present employers without permission. Box D-978, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

EXECUTIVE GEOLOGIST: A sizable company with headquarters in Tulsa engaged in various branches of the oil industry, but heretofore not extensively in the production branch, desires to contact someone who from ability and experience could take the lead in deciding on a slow but expanding production program and who could slowly but steadily get such a program started and under way—hiring from time to time qualified men to round out an adequate Exploratory Production Department, compensation would be on a salary basis only but commensured with experience and growth of activities under your supervision. Replies will be treated strictly confidential in all cases. Box D-957, The Oil and Gas Journal, Tulsa, Oklahoma.

—Position Open—
ASSISTANT to VICE PRESIDENT

Major oil field equipment manufacturer has position open for Assistant to Vice President. Must be capable of developing defense contracts and new products sales. Give qualifications and experience. All communications confidential. Box D-955, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED:

Exploratory Geologist familiar with and preferably now residing in Southern Oklahoma. Must be aggressive and experienced. Fine opportunity with progressive Independent.

Box D-967, The Oil and Gas Journal Tulsa, Oklahoma

ENGINEERS

Process (Chemical) Engineers
Construction Engineers
Project (Mechanical) Engineers

To Work On

Petroleum, Petro-Chemical and Chemical Projects

Write in complete detail, giving positions held, references, education, salary expected. Personal interview can be arranged.

Address Personnel Department

E. B. BADGER & SONS COMPANY

75 Pitts St., Boston, Mass.

HELP WANTED

WANTED by progressive independent an experienced lease and landman for North Central Texas. All replies held in strict confidence. Box D-960, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List. Box 2603, Tulsa, Okla.

SALES ENGINEER with recent mechanical engineering degree to join organization handling equipment for refineries, gasoline and chemical plants in Houston. Experience not essential. Box D-948, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST 15 years experience available July seeks permanent location supervising interpreting reviewing seismic gravity magnetics in Caribbean Area, Brazil, Mexico, Peru. Box D-937, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, Ph.D. candidate, over five years experience, seeks employment anywhere with oil company or consultant. Write L. Banks, 500 Elm Road, State College, Pa.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-939, The Oil and Gas Journal, Tulsa, Oklahoma.

PUBLIC ACCOUNTANT located in Tulsa can handle additional part time bookkeeping and tax clients. 25 years' experience. P. O. Box 812, Tulsa, Oklahoma.

EXPERIENCED gas engineer desires change in location. B.S. Degree in Chemical Engineering. 20 years experience. Know all phases natural gas, gasoline plant and gas pipeline work. Would be especially interested in building and operating gasoline plant for interest. Now in supervisory position. Present salary $6900.00 per year. Desire location East Texas, South Arkansas or Louisiana. Excellent references. Box D-977, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineering Graduate, Okla. U. 3 yrs. experience drilling, production and sales major oil company. Desire position with development company, royalty company or small oil company in executive assistant capacity. Officer in U. S. Marine Corps to be relieved active duty April. Desire interview with prospective employer. Reference. Box D-966, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

PRIVATE PARTY wants to invest up to $150,000.00 in producing royalties or settled production. Small or large deals considered. Box D-912, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

OIL DEALS WANTED
Independent Operators seeking immediate drilling deals with good geology. Box D-972, The Oil and Gas Journal, Tulsa, Oklahoma.

PLANNING to develop a partly proven oil-gas field in Allegany County, N. Y. Interest may be had for cash or good used casing, drive pipe and well equipment. If interested, write for details. C. N. Wilber, Box 625, Westfield, Pa.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

ATTENTION CAPITAL OIL INVESTORS. We have large acreage offsetting 400 bbl. well acreage in Ill. Also acreage in Okla., Kansas ready to drill. We can present at this time the work of our oil locator instrument, which works only on oil in the structures. Acreage surveyed by instrument which has proven accurate in last thirty wells surveyed. This is your opportunity for good investment. If interested in helping finance above acreage, write: Anglo-American Co-Operative Oil Co., 69 West Washington St., Suite 1209, Chicago, Ill.

240 ACRE LEASE in Wabash County, Southern Illinois, for assignment to right party for drilling contract and override. Can furnish section location, has lime, sand formation, also good pumper. Lease is ¼ mile from pipeline. For all information write: Mrs. Grace V. Tanquary, 438 Plum Street, Aurora, Illinois.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

S.E. NEW MEXICO OILFIELDS

Latest Major Company (Pennsylvania) discovery South Roosevelt County offers attractive investment possibilities in royalty & leases. And indicates additional major oilfields on seismograph structures along trend where wells are drilling or about to drill on major blocks. Details on request.

W. J. PETERMAN, GEOLOGIST
Portales, New Mexico

LEASE AND DRILLING BLOCKS

A GOOD SPECULATION in oil development is filing on Government Lands in potential developing areas. Write: S. W. Pressey, Box 614, Pueblo, Colorado.

FOR SALE: OIL and Gas Lease in North Stephens County, Texas. 722.89 acres. Abstract title furnished. A. H. Cox, Ivan Star Route, Breckenridge, Texas.

KANSAS OIL DEALS WANTED: Reputable independent operator and producer solicits your drilling deals. Box D-974, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL assign my half interest in forty acres oil lease for $5,000 to be used to drill new well offsetting well spoiled by "shot" after initial production rated 100 barrels daily, in Arbuckle formation about 840 feet depth. This 40 acres is part of 480 acres one block now operating with ten oil wells about 15 years old—need $5,000 to cover drilling contractor and casing costs for Burgess gas seal around 500 feet and oil string to production, with tubing rods and pump complete to tank separator and storage. Have two tank car spur on lease and fully equipped to operate. Abernathy Kansas State Geological report 1939 states original wells averaged 30 to 120 barrels initial production from Arbuckle. Would give another 40 acres under same terms for second well to be drilled. Inspect leases in person for appointment write P. O. Box 128, Chetopa, Kansas.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

SERVICES

PRONTO COMPASS, constructed on the principle of surveyor's compass, 360 degrees divided into four 90 degree quadrants. Indispensable for metes and bounds land descriptions. Laminated construction. Clear Vinylite. Easy to read figures. $1.50, with complete instructions. Mention this ad, and receive free, Pronto 6 6 0 scale, Chains, Rods, and Feet; eight inches long. Pronto Land Measure, Post Office Box 265, Flint, Michigan.

METER CHART COMPUTING
by INTEGRATOR METHOD

All work supervised by experienced personnel.

SPECIAL CHART AUDITS

JOHN P. SQUIER COMPANY
Box 6100 **Dallas, Texas**

WANTED

OGDEN S. JONES
CONSULTING GEOLOGIST

For 15 years Director of the Oil Field Section, Kansas State Board of Health. Can be a valuable service to the oil industry in all problems pertaining to salt water disposal. Ground water geology, direction of water flow, etc. Can qualify as an expert witness in any court.

Address correspondence to:

1505 University Drive, Lawrence, Kansas
Phone 3208

WANTED

WANTED

LEASES FOR SALVAGE PURPOSES

Pipe Lines and Gathering Systems
Tanks, Pumping Units, Casing, Tubing

Immediate Inspection——Get Our Offer Before You Sell

OILFIELD PIPE & EQUIPMENT BOUGHT, SOLD & TRADED

BROWN PIPE & MACHINERY CO.

P.O. Box 2368 **Phone 3-9391**
Corpus Christi, Texas

API Pipe Threading With Latest Landis Machines

FOR SALE

CAFE FOR SALE
Very high highway traffic count.
T. E. Davis, Davis, Okla.

Executive Type
TWIN ENGINE BEECHCRAFT
Model D18S
A-1 Condition
Total airframe hours—2950
Hours since major engine overhaul—
430 & 610
Zero time spare engine available.
Price—$50,000
Box D-976, The Oil and Gas Journal
Tulsa, Oklahoma

FOR SALE
MODERN OFFICE and WAREHOUSE BUILDING
IN HOUSTON, TEXAS
Located in Heart of Best Commercial and Industrial Area—on Navigation Blvd. Suitable for Manufacturing, Warehousing or Fabrication. 2.8 Acres—300 Feet Frontage; Will Subdivide Land area. 13,200 Square Feet Office Space on Two Floors 15,400 Square Feet Floor space in Warehouse Section. Ample Railroad Sidings. Modern Two Story Brick, Steel and concrete Office Building fully Air-Conditioned (completed September 1949). Warehouse of Steel and Corrugated Iron Construction. Overhead Hoists and Monorail Crane.
For complete information, Write or Call
Jarecki International Supply Division, H. K. Porter Company, Inc.
P. O. Box 1910, Houston, Texas, or
Atlantic Building, Dallas, Texas.

EQUIPMENT MEN

(Continued from page 295)

for extending mobile coverage, microwave relay with standby including simplicity of multiplexing and control, and control devices for selective switching, telemetering, and supervisory control of the operating functions of the petroleum industry.

Bausman Heads Koppers Central Staff Sales

Cooke Bausman, Jr., has been appointed manager of the sales department of central staff of Koppers Co., Inc.

Bausman joined Koppers in 1948 as assistant manager of the sales department, and since last November has been acting manager of the department.

Following his schooling, Bausman joined Mellon Securities Corp.'s sales department in Pittsburgh, and later was transferred to that firm's New York office, working in sales and security trading.

Following the war Bausman became general manager of the Pennsylvania Ultraviolet Co.

Big Three Is Main Exhibitor At Industrial Exposition

With 24 exhibit booths, totaling 240 ft. in length, Big Three Welding Equipment Co., with its 20 different manufacturers whom they represent, dominated the Industrial Exposition at Houston March 11-17. A 240-ft. sign enclosed the exhibits of Bonnie Forge & Tool Works, Cleco Division—Reed Roller Bit Co., Contour Marker Corp., Diamond Metal Co., Foster Transformer Co., Houston Oxygen Co., Invincible Co., Lincoln Electric Co., Morton Gregory Co., Ohmsted Machine Co., Sanstorm Manufacturing Co., Schramm Co., Smithweld Co., Victor Equipment Co., Wall Colmonoy Corp., Worthington Pump & Machinery Co., and ZeGco.

Rhoades to Head Happy Sales and Service

F. E. RHOADES

Paul G. Mahaffey, president of Happy Co., Tulsa, recently has announced the appointment of F. E. (Dusty) Rhoades to head its sales and service activities in the Oklahoma and Texas Panhandle territory, with headquarters in Pampa, Tex. Rhoades has been in charge of sales and service in the Indiana and Illinois division for the past several years.

Hayden O. Parent, former store manager at Salem, Ill., has been named to succeed Rhoades as sales manager of that division.

Davis to Manage New Cyanamid Catalyst Plant

Production Manager C. F. Bonnet, of Cyanamid Co., industrial-chemicals division, has announced the appointment of C. S. Davis as plant manager for Cyanamid's new petroleum-cracking catalyst plant at Michigan City, Ind. The new plant is scheduled to go into operation in June 1951, and will be concerned mainly with the manufacture of microspheroidal-type cracking catalyst.

For the past 2 years Davis has been general superintendent of the company's plant in Marietta, Ohio.

Shaw on Mission to Middle East for Petro-Chemical

George E. Shaw, of Petro-Chemical Equipment Co., Inc., Houston, is on a mission of several weeks' duration in Iran as a consultant in connection with filtration problems at the Abadan refinery of Anglo-Iranian Oil Co.

Petro-Chemical is a corporation specializing in filtration engineering, materials handling, electric motors, and power transmission equipment, and allied lines.

Wayne Rives Is Partner In Houston Advertising Firm

WAYNE RIVES

Wayne Rives, vice president of The Oil and Gas Journal in Houston, has resigned, effective April 15, and has become a partner in Rives, Dyke & Co., Houston advertising agency.

Rives joined the advertising staff of the Journal in 1935 as advertising representative on the Gulf Coast. In 1946, he was named advertising manager of the Journal and Petroleo Interamericano, with offices in Tulsa. He returned his headquarters to Houston in 1948 when he was elected vice president in charge of the Gulf Coast division.

During the past 16 years, Rives has been active in oil-industry activities and was elected president this year of the Houston Chapter of Nomads, a national fraternity of oil men and oil-equipment manufacturers who have traveled in foreign fields in behalf of the oil industry.

John M. Spears, an assistant to Rives in the Houston office since 1948, will become manager of advertising sales on the Gulf Coast.

Rives, Dyke & Co. is one of Houston's largest industrial agencies and specializes in oil-equipment advertising. Other partners in the firm are Earl Rives and Frank Dyke. Offices of the company are located at 2611 Sunset Boulevard, Houston.

ADVERTISERS IN THIS ISSUE

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LEGAL

Sealed bids for oil and gas mining leases on certain trust lands on the Crow Indian Reservation, Big Horn County, State of Montana, will be received at the Office of the Superintendent, Crow Indian Agency, Crow Agency, Montana, up to 2:00 o'clock, P.M., Montana Standard Time, April 27, 1951. For further information, call or write L. C. Lippert, Superintendent, Crow Indian Agency, Crow Agency, Montana.

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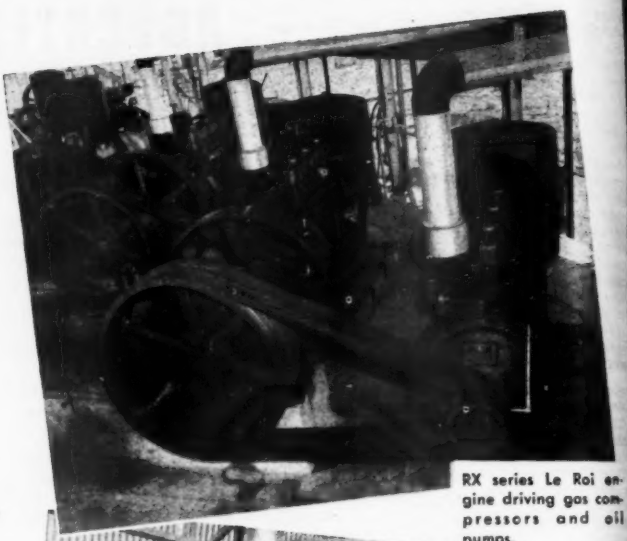

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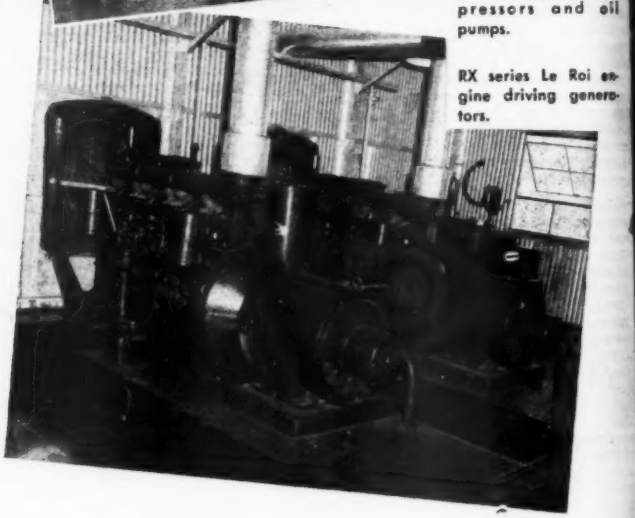

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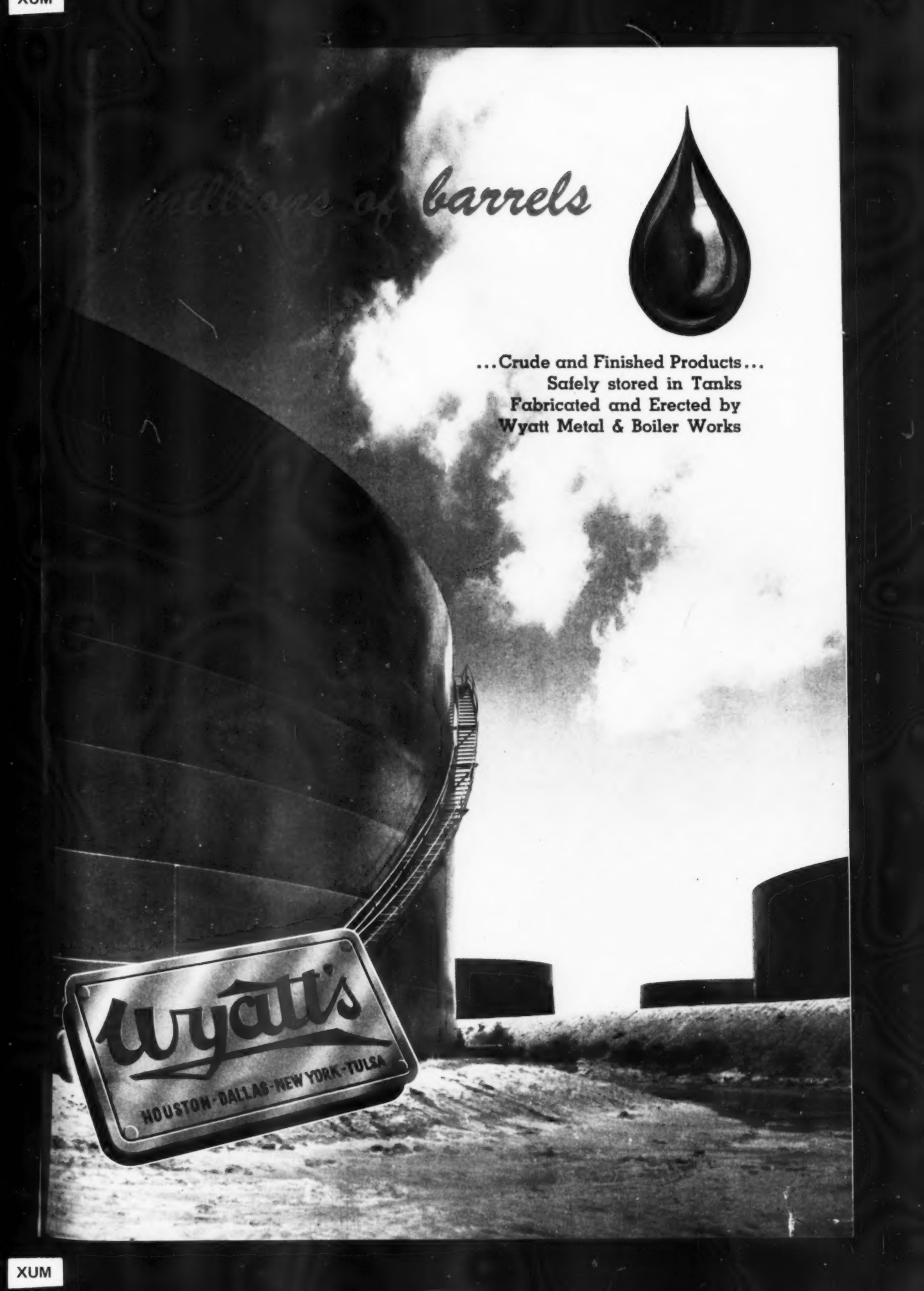
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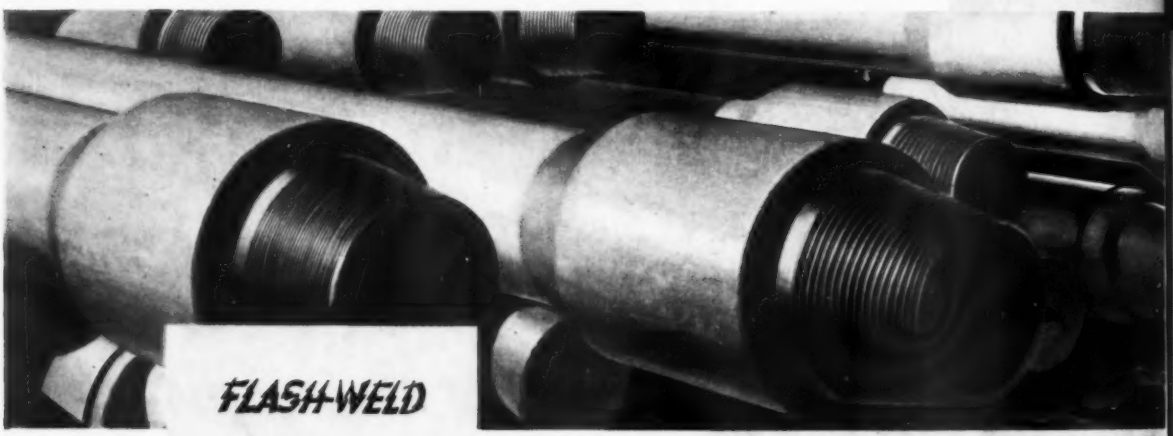

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